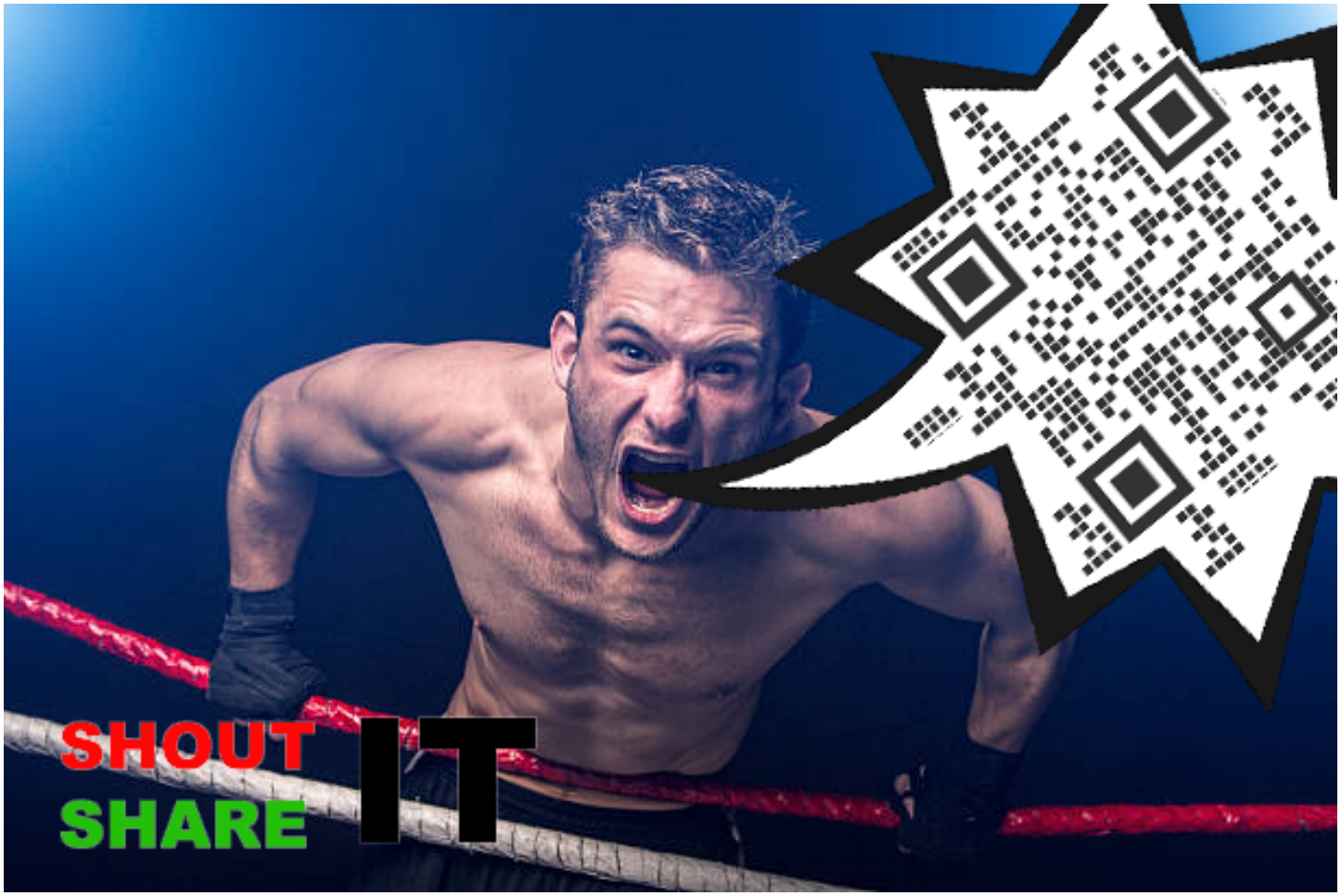
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SALIENTIA OF VENEZUELA

BY JUAN A. RIVERO

Institute of Marine Biology and Biology Department
University of Puerto Rico
Mayaguez, Puerto Rico

WITH ONE PLATE

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No. 1 — Salientia of Venezuela

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INTRODUCTION

The following report contains an account of the frogs of the Venezuelan Republic. It is based mainly on the material collected by the author in Territorio Amazonas and belonging to the University of Puerto Rico (U.P.R.) and on specimens deposited in the Museum of Comparative Zoology at Harvard (M.C.Z.), the American Museum of Natural History (A.M.N.H.), the Chicago Natural History Museum (C.N.H.M.), the Museum of Zoology of the University of Michigan (U.M.M.Z.), the United States National Museum (U.S.N.M.) and the Museo de la Universidad Central de Venezuela (U.C.V.), but species reported in the literature and unavailable to the author for examination have also been included. The number of Venezuelan specimens studied comprises a total of about 1250. Twenty-four genera and ninety-six species are represented.

The paper as originally written included a description of the physiographical provinces of Venezuela and a short discussion of the fauna that each of them contains. For several reasons, it has been found more convenient to separate the two sections and give priority of publication to the taxonomic portion. It is hoped that the section on zoogeography will follow in the near future.

ACKNOWLEDGMENTS

I gratefully acknowledge the courtesies extended to me by members of the Venezuelan government, especially Col. Dn. Miguel Nucete Paoli, then Governor of Territorio Amazonas, and the secretary Dr. Luis Linares. Mr. Janis Roze, of the Universidad Central de Venezuela, not only has loaned me the frog collection of his institution but has provided valuable information on the localities and habits of the species included. For his courtesy I am more than appreciative.

I should be ungrateful if I did not express my appreciation to persons that helped me collect in the field: Mr. Ventura Barnés Jr., leader of the University of Puerto Rico Expedition to Venezuela, 1950, whose extensive knowledge of South American tropics made him a valuable advisor and guide; Dr. Jenaro Maldonado, entomologist and companion of several night searches for frogs and insects; Dr. Paul Nesbitt, anthropologist of the expedition; Dr. Hans Baumgartner of Puerto Ayacucho, a great friend of naturalists of Territorio Amazonas and a man with a great desire to help others. From the latter I received a number of specimens as well as his experienced cooperation in the field.

For the loan of specimens used in this study or for information regarding specimens under their custody, I am indebted to Mr. Charles Bogert and Mrs. Bessie Hecht of the American Museum of Natural History, Dr. H. Wermuth of the Berlin Museum, Dr. H. W. Parker, Miss A. G. Grandison and Mr. J. C. Battersby of the British Museum, the late Mr. K. P. Schmidt, Messrs. Clifford Pope and Hyman J. Marx of the Chicago Museum of Natural History, Drs. Norman Hartweg, Charles Walker and James A. Peters[1] of the Museum of Zoology of the University of Michigan, Dr. J. Guibé of the Paris Museum, the late Dr. E. R. Dunn of the Philadelphia Academy of Sciences, Dr. Robert Mertens of the Senckenberg Museum and Dr. Doris Cochran of the U.S. National Museum.

But my chief obligations for assistance in this work are to the late Dr. E. R. Dunn, Mr. Benjamin Shreve, Mr. Arthur Loveridge and Dr. Ernest Williams. Dr. Dunn placed at my disposal through letters and through personal conversation his immense knowledge of South American Amphibia, while Mr. Shreve, with his excellent taxonomic eye and accurate memory has helped me solve several problems that I would have been unable to solve myself. Mr. Loveridge and Dr. Williams not only have taken a personal interest in all the phases of my work, but have read the manuscript and suggested some changes. However, for the shortcomings of this paper the author assumes full responsibility. *Prostherapis dunni, Prostherapis shrevei, Hyla loveridgei* and *Eleutherodactylus williamsi* have been named after these four persons.

Hyla benitezi is dedicated to Dr. Jaime Benítez, Chancellor of the University of Puerto Rico, without whose efforts and interest the expedition (during the course of which many of the specimens here reported were collected) would never have been possible.

Finally, I am indebted to my wife for the bibliographical work, for typing the manuscript and for her constant help and encouragement during the course of this work.

HISTORICAL RÉSUMÉ

One of the earliest reports of Venezuelan amphibians is that of Lichtenstein and Martens (1856). Recorded as coming from Venezuela are: *Notodelphis ovifera* (= *Gastrotheca ovifera*),

[1] Now at San Fernando Valley State College, Northridge, California.

Hyla palmata (= *H. boans*), *Hyla versicolor* (?), *Hylodes martinicensis* (= *Eleutherodactylus gollmeri*), *Crossodactylus Gaudichaudii* (?), *Cystignathus ocellatus* (= *Leptodactylus ocellatus*), *Cystignathus typhonius* (= *Leptodactylus sibilatrix*), *Bufo agua* (= *B. marinus*), *Bufo Leschenaultii* (= *B. guttatus*) and *Bufo strumosus* (= *B. granulosus*). *Phrynidium crucigerum* (= *Atelopus c. cruciger*) is described from Veragua. In 1863, W. Peters described *Hylodes gollmeri* on the basis of Lichtenstein and Marten's *Hylodes martinicensis*. I have been unable to determine the origin of this collection, but it appears that many of the specimens were collected by Consul Gollmer in the vicinity of Caracas. *Bufo guttatus* in all probability came from the southern forests or at least from the Orinoco Delta while *Gastrotheca ovifera* may be the specimen or specimens collected by Appun in Cumbre de Valencia (Ernst, 1877: 281). It was Dr. Dunn's opinion (letters, 1.7.51, 7.10.51) that this collection may have been mixed with one from Panama probably collected by Warschewitz (see remarks on page 173.)

Other important collections in the Berlin Museum were made by Appun, Salomón Briceño, Kumurow, Martin, Moritz, Otto, Rothe, Rosenberg, Wessel and Fisher. Less rich are the collections received from Brandt, Bancard, Eckermann, Effeldt, Ernst, Gundlach, Hagenbeck, Hübner, Klaebisch, Kummer, Mauss, Thivaites, Ursulauf, Valentiner and Lüning (Wermuth, letter 25.8.51). A small collection made by Carl Sachs in Ciudad Bolívar and Calabozo was reported on by Peters in 1877.

In 1892, O. Boettger reported on the frogs of the Senckenberg Museum, citing eleven Venezuelan species, all coming from Caracas and collected (except one) by Hübner and Schlesinger. In a later paper (1893), a group of seven Puerto Cabello (Coll. Mauss) and one "Venezuelan" (Coll. Schultzer) species were added to the list and in 1896, a report was made on 17 species collected by Hübner in the Alto Orinoco.

Most of the Venezuelan specimens reported by Günther, 1858, and Boulenger, 1882, were acquired by the British Museum from Brandt and Dyson, two Natural History dealers. Dr. Parker informs me (letter, 25.7.51) that he has not been able to discover if Brandt was ever in Venezuela. D. Dyson visited that country in 1851-60 and collected in Colonia Tovar, Valle de Aragua, La Guaira and Cariaco.

In 1877, A. Ernst published a book in which he devoted a paragraph to discussing the amphibians of Venezuela, mentioning

four species and two additional genera without citation of species. Stejneger's report on the collections made by Lyons and Robinson in La Guaira and San Julián came out in the Proceedings of the U. S. National Museum for 1902. Apart from some separate descriptions and a short report by Boulenger on the frogs collected by Briceño in Mérida (1903), little was added to Venezuelan amphibiology between 1902 and 1927, when A. Lutz published his "Notas sobre batrachios da Venezuela e da Ilha de Trinidad." Until now this has been the most complete account of the Venezuelan frogs, and although it contains a few errors of interpretation, it is undoubtedly an important contribution and one that has been of great help in the present studies. Dr. Lutz's paper is based mainly on his own collections and observations in the region of Maracay. In the same year Roux published the description of *Hyla luteocellata* on the basis of two male specimens coming from El Mene in the Falcón State (Colls. Kugler and Vonderschmitt).

During more recent years other authors have mentioned a few species of frogs. Most important among these are Schmidt (1932), who reported on specimens from Mt. Turumiquire and vicinity (Coll. Blake), Parker (1936), who had specimens from the Upper Orinoco (Coll. Wavrin), Shreve (1947), who reported on the collection made by H. G. Kugler in Falcón State, Alemán (1952 and 1953) who had collections from the region of Baruta, El Hatillo and Kumana, respectively, and Walker and Test (1955) who described three species of *Eleutherodactylus* from Rancho Grande (Coll. Test).

The most noteworthy and until now unreported collections in the American museums are those of Baker (U.M.M.Z.; Carabobo, Yaracuy, Táchira); Barnés (C.N.H.M.; Yaracuy, Aragua, D. F.); Beebe (U.S.N.M.; Aragua, Monagas); Briceño (Mérida); Carriker (U.S.N.M.; U.M.M.Z., Mérida); Cherrie (U.S.N.M.; Bolívar); Holt (U.S.N.M.; Aragua, Miranda, D. F., Terr. Amaz.); Mondolfi and Vivas Berthier (U.S.N.M.; Aragua, Miranda, D. F., Faleón, Guárico); Osgood and Osgood and Conover (C.N.H.M.; Mérida); Pinkus (U.M.M.Z.; Roraima Region); Rosenberg (Mérida[2]); Tate and Tate and Carter (A.M.N.H.; Turumiquire, Duida and Roraima regions); Vogl (U.S.N.M., C.N.H.M.; Aragua); Schultz (U.S.N.M.; Maracaibo Basin); Weber (M.C.Z.; Bolívar); and Williamson, E. and J. (U.M.M.Z.; Carabobo, Yaracuy, Táchira).

[2] Represented in most museums.

In 1942, E. Röhl published his "Fauna Descriptiva de Venezuela," which was revised in 1949. A few species of frogs are included and although there are several errors, the book furnishes common names and contains two records otherwise reported only by Ernst.

The Universidad Central de Venezuela has a good representation of native frogs, which has been mostly collected by the director of the museum, Dr. Racenis, and Mr. Janis Roze, a young instructor and enthusiastic curator of Herpetology. Most of the specimens come from Aragua, Distrito Federal and Guárico. Except for the types and paratypes, the tag numbers of the U.C.V. specimens should be considered provisional.

METHOD OF TREATMENT

The Venezuelan frog fauna, as known today, comprises 24 genera and 93 species. The discussion of each of them includes the Venezuelan synonymy and a description that, except when otherwise stated, is based strictly on Venezuelan material. Where specimens were not available, the original descriptions have been used. The contents of these have been slightly modified to suit my purpose but in no case (and no matter how poor the original) has the description been altered in meaning or the original remarks modernized in any way.

The group of specimens used in the writing of the description in each case is listed following the synonymy. Usually the specimens chosen for the description are from a single region. This has been done to insure the homogeneity of the sample described. Following the description of the species, measurements (in mm.) of a male and female are given, not necessarily of the largest, but of the best preserved specimens. Measurements of most of the specimens studied were recorded but it has not been considered desirable to publish them in the present report.

The list of localities includes those for the material deposited in the museums mentioned in the introduction of this paper as well as those given in the literature. When a specimen was not examined to my complete satisfaction (because it was temporarily missing from the shelves or for some other reason) its number is followed by an asterisk. The heading "Additional Localities" is used in each case to include records of specimens that have not been used in the description.

Following the list of localities is the range of the species. This includes the range within Venezuela and also other countries

where the forms under consideration are said to occur. This last is based on the literature and on the specimens deposited in the different museums. Although representatives of many of the species occurring in the surrounding countries were carefully examined, in some instances it has been necessary to accept the records taken from the files.

A list of most of the localities mentioned in this paper, and a description of those where frogs have been collected is given at the end of the taxonomic section.

EXPLANATION OF TERMS AND MEASUREMENTS

The following is a list of the terms and measurements used in the text. A short explanation of amphibian terminology is given to help students who are beginning in this field, while Spanish equivalents are supplied in the belief that they may be of some value to the trained English-speaking specialist as well as to the Latin American student having little knowledge of English.

1. Head (cabeza). The head may be as long as broad (tan larga como ancha), longer than broad (más larga que ancha) or broader than long (más ancha que larga). The length is measured between the tip of the snout and the posterior margin of the tympanum, the breadth at the greatest distance between the tympana. When the tympanum is hidden the measurements are taken from or between the angles of the mouth. As the ratio of length to breadth can be easily found from the measurements given for each species, the character is only mentioned in the description when the difference from other species in this regard should be emphasized. In some cases, as in the genus *Leptodactylus* in general, and especially in *L. bolivianus* and *L. ocellatus*, the ratio of length to breadth is quite variable although the proportion given is the usual one.
2. Crests or ridges (crestas o aristas). Ridges that occur on the heads of some bufonids and hylids. The subnasal ridge (arista subnasal) is usually the semicircular prolongation of the canthal crest around the nostrils (*Bufo granulosus*). The canthal crest (cresta cantal) runs along the canthus rostralis; the orbitotympanic or supratympanic (orbitotimpánica o supratimpánica) lies above the tympanum, and the orbital (orbital) around the orbit. The latter may be divided into pre-, supra-, post- and infraorbital.

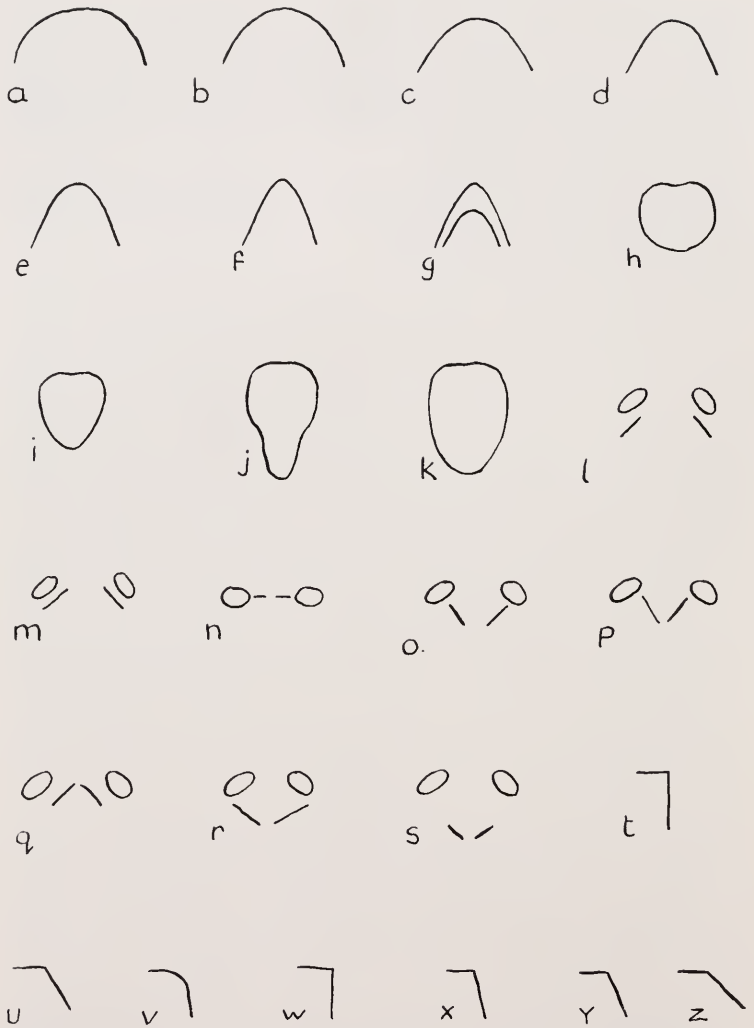

Fig. 1. a-g, shapes of snout; h-k, shapes of tongue; l-s, vomerine teeth; t-z, canthus and loreal region. See text pp. 11-16.

3. Snout (hocico). The snout may be semicircular (semicircular) as in Figure 1a, e.g. *Centrolene buckleyi;* almost semicircular (casi semicircular) as in Figure 1b, e.g. *Hyla marmorata;* rounded (redondeado) as in Figure 1c, e.g. *Hyla*

granosa or *Leptodactylus rugosus;* subovoid (subovoide) as in Figure 1d, e.g. *Leptodactylus pentadactylus;* subelliptical (subelíptico) as in Figure 1e, e.g. *Leptodactylus bolivianus;* or acuminate (acuminado, aguzado) as in Figure 1f, e.g. *Leptodactylus sibilatrix.* It may project over or overhang the mouth (saliente) in a shark-like fashion as in Figure 1g, e.g. *Leptodactylus sibilatrix;* be truncate (truncado), e.g. *Prostherapis trinitatis,* or swollen and elevated in front (hinchado y elevado al frente), e.g. *Hyla granosa* and *boans.*

4. Derm of the head involved in cranial ossification (piel de la cabeza comprendida en la osificación craniana). Easily recognized by determining if the skin is free from the cranium. *Gastrotheca ovifera* is a good example.
5. Tongue (lengua). With respect to form, the tongue may be circular or rounded (circular o redondeada) as in Figure 1h, e.g. *Centrolene buckleyi;* cordiform (cordiforme) as in Figure 1i, e.g. *Hyla tibiatrix;* pyriform or spatulate (piriforme o espatulada) as in Figure 1j, e.g. *Bufo guttatus;* or oval (ovalada) as in Figure 1k, e.g. *Leptodactylus bolivianus.* With respect to its breadth, it may be broad (ancha), e.g. *Hyla loveridgei,* or narrow and with parallel edges (estrecha y con márgenes paralelos), e.g. *Bufo granulosus.* It is free (libre) only when attached to the anterior part of the mouth, and adherent (adherente) when completely attached to the floor. When indented (indentada) behind, it is said to be emarginate (emarginada), nicked or notched (escotada, incisa), and when lacking the indentation, entire (entera).
6. Vomerine teeth or odontoids (dientes u odontoides vomerianos). In a series of two on the palate, in the vicinity of the posterior nares. They may be distinct (distintos) as in most species, indistinct (indistintos), e.g. *Pleurodema brachyops,* or absent as in *Bufo, Prostherapis* and some hylids. They may form different designs as in Figures 1l to 1p; between (entre) the choanae (choanas) as in Figure 1q; behind (detrás) them as in Figure 1r; or behind and between (detrás y entre) them as in Figure 1s.
7. Canthus rostralis (canto rostral). The ridge or angle formed between the eye and tip of the snout by the outer edges of the snout bones. It may be angular (angular) as in Figure 1t, e.g. *Bufo guttatus* (a right angle is implied); obtusely angular (angular obtuso) as in Figure 1u, e.g. *Hyla boans;* rounded (redondeado) as in Figure 1v, e.g. *Hyla minuta,*

indistinct (indistinto), or absent (ausente) where no external angle is formed and the snout would present a smooth, semicircular appearance if seen in cross-section.

8. Loreal region (región loreal, región frenal, mejilla [Espada]). The area bounded anteriorly by the nostrils, posteriorly by the eyes, dorsally by the canthus and ventrally by the upper lip. It may be straight or vertical (recto o vertical) as in Figure 1w, e.g. *Bufo guttatus;* almost vertical (casi vertical) as in Figure 1x, e.g. *Bufo typhonius;* little sloping or oblique (poco inclinado u oblicuo) as in Figure 1y, e.g. *Hyla misera* and *crepitans;* and oblique or sloping (oblicuo o inclinado) as in Figure 1z, e.g. *Hyla granosa.* It may also exhibit a depression (depresión) in which case it is concave or excavated (cóncavo o excavado) or be completely flat or non-concave (plano o no cóncavo). On occasions it may be slightly convex (un poco convexo).
9. Interorbital space equal, shorter or broader than an upper eyelid (espacio interorbital igual, más corto o más ancho que un párpado superior). The interorbital space is measured in the middle, between the two upper eyelids, the eyelid by depressing it slightly and measuring from the origin to the outer margin. When the space is said to be equal to the eyelid it can be expected to be slightly narrower or broader in some specimens. As definite numbers used in the comparison (e.g., interorbital space 1¾ times broader than an upper eyelid) are of no value in practice, and may even obscure the importance of other characters, they are used as little as possible in the text.
10. Eye diameter equal, shorter or longer than distance between eye and nostril (diámetro del ojo igual, más corto o más largo que la distancia entre el ojo y la nariz). The diameter of the eye is measured between the two corners, the distance between eye and nostril, between the anterior corner of the eye and the posterior of the nostril. When the diameter of the eye is as long as the snout (tan largo como el hocico) it is implied, of course, that it is also longer than the distance between eye and nostril. Only in genera where the character is variable and important, the comparative distance between nostril and eye and nostril and tip of the snout is given, e.g., nostril closer to the eye than to the tip of the snout (nariz más cerca del ojo que de la punta del hocico).

11. Metacarpal and metatarsal tubercles (tubérculos metacárpicos y metatársicos [Espada]). Since they are present in most species, they are only mentioned in the description where they are larger or smaller than usual or when they are modified in such a way as to be useful in the determination of the species. In some cases one or both of the metacarpal or metatarsal tubercles are absent.
12. Subarticular tubercles (tubérculos subarticulares, nudillos o pelotillas infra-articulares [Espada]). Found under the articulations of the digits and toes. Their mention is avoided if they lack any distinctive feature.
13. Web (palmeadura [Espada], membrana interdigital, membrana natatoria). Loveridge's system of measuring the amount of webbing by giving the number of free phalanges has been adopted here as it has the advantage of being standard, a feature that is absent in the other system (½ webbed, etc.). Since different authors use different fingers or toes or all of them to determine the amount of webbing, it is difficult to make a general comparison, but in general it can be said that Boulenger's ⅔ webbed fingers have 1½ free phalanges on the outer finger, his ½, 2 and his ⅓, 2½. When present, the disk contains the outer phalanx. For measuring the number of free phalanges, the fingers and toes are placed close together and the extension of the web is determined by considering the middle, not the margins of the membrane. The web of the first finger is that between the first and second fingers, of the second, that between second and third, of the third, that between third and fourth and of the fourth, that between third and fourth also but in relation to the fourth.
14. Lateral fringes of toes and fingers (margen cutánea de los dedos de los pies y las manos). This character seems to be quite valuable in some cases. When said to be faintly indicated, the fringes may be completely absent in some specimens. On the other hand, a species that does not normally show lateral fringes may show some indication of them in a badly desiccated state. Allowance should be made for such cases. In a few species, e.g., *Leptodactylus podicipinus*, there are lateral flaps that may go around the toe for ¼ of its circumference.
15. Tarsal fold (repliegue társico). A cutaneous fold or ridge that extends usually obliquely along part or all the length of

the tarsus. In some species, e.g., *Pseudopaludicola pusilla*, the tarsal fold begins with a tubercle in the middle of the tarsal segment.

16. Metatarsal fold (repliegue metatársico). A slight skin fold or close line of tubercles that extends along the outer margin of the metatarsal segment and outer toe.
17. Hidden portions of the hind limbs (porciones ocultas de las extremidades posteriores). Those parts of a frog's hind limb that cannot be seen from above or below when the animal is in the resting position.
18. Heel of the adpressed hind limb extends to the shoulder, the tympanum, the eye, the nostril, the tip of the snout (la extremidad posterior extendida a lo largo, el tobillo llega a el hombro, el tímpano, el ojo, la nariz, la punta del hocico). Obtained by stretching the hind limb anteriorly and determining the place to which the tibio-tarsal articulation extends. Sometimes a valuable character although it should not be interpreted too closely. A broken limb bone alters the heel extension completely.
19. Secondary sexual characters (caracteres sexuales secundarios), as the hooks or rugosities on the inner finger of some males, the breast spines of *Leptodactylus pentadactylus*, the chin spines of *Leptodactylus rugosus*, the swollen arms of *Leptodactylus ocellatus*, the external vocal pouches of many species, the longer arms of the male *Atelopus oxyrhynchus*, the snout ridge of *Leptodactylus mystaceus*, the tubercular dorsum of the male *Hyla taurina*, etc. Most of these characters are only shown by the males during the breeding season.

Key to the Families of Venezuelan Frogs

I. Vertebrae convex anteriorly, concave posteriorly (opisthocoelous); sacrum fused with the urostyle.

Eustachian tubes opening through one orifice into the pharynx; tongue and eyelids absent ..... PIPIDAE

II. Vertebrae concave anteriorly, convex posteriorly (procoelous); sacrum articulated with the urostyle by two condyles.

A. Right and left half of the pectoral girdle overlapping, movable (arciferal).

1. No small cartilage (intercalary) between the last and penultimate phalanges; terminal phalanges simple or T-shaped; transverse processes of the sacral vertebrae (sacral diapophysis) cylindrical or dilated; belly smooth or granular.

a. Omosternum absent, parotid gland present, upper jaw not toothed ..... BUFONIDAE

b. Omosternum present, parotid gland absent or small and inconspicuous; upper jaw toothed ..... LEPTODACTYLIDAE

2. A small piece of cartilage (intercalary) between the last and penultimate phalanges; transverse processes (sacral diapophysis) of the sacral vertebrae generally dilated; belly granular; toes generally webbed.
   a. Terminal phalanges T-shaped, astragalus and calcaneum fused ..... CENTROLENIDAE
   b. Terminal phalanges claw-shaped, astragalus and calcaneum not fused ..... HYLIDAE
3. An accessory phalanx in digits; terminal phalanges simple (*Pseudis*), or claw-shaped (*Lysapsus*); transverse processes (sacral diapophysis) of sacral vertebrae cylindrical; toes webbed ..... PSEUDIDAE

B. Right and left half of the pectoral girdle fused in the middle, immovable (firmisternal).
1. Omosternum present; sternum cartilaginous; fingers and toes with dermal scutes on the disks ..... DENDROBATIDAE
2. Omosternum absent; sternum bony; fingers and toes without dermal scutes on the tips ..... ATELOPODIDAE

III. First seven vertebrae procoelous; 8th biconcave, sacral, biconvex (diplasiocoelous), articulated with the urostyle by two condyles.
A. Teeth present, palate normal ..... RANIDAE
B. Teeth absent, palate with two dermal ridges in front of the pharynx ..... MICROHYLIDAE

PIPIDAE

Key to the Species of Pipa *Recorded from Venezuela*

I. Two lateral flaps at the angle of the mouth; one large metatarsal tubercle ..... *pipa*
II. Lateral flaps at the angle of the mouth absent; no metatarsal tubercles ..... *parva*

Pipa pipa (Linné)

Rana pipa Linné, 1758, Syst. Nat., ed. 10: 210: Surinam.
Pipa dorsigera Ernst, 1877, Flora y Fauna de Ven.: 281.
Pipa pipa Dunn, 1948, Amer. Mus. Novit., no. 1384: 9.
Pipa americana Röhl, 1949, Fauna Descr. de Ven., ed. 2: 395, fig. 177.

No Venezuelan material examined.

1 (M.C.Z. 6127) Trinidad.
3 (M.C.Z. 1244) Dutch Guiana.

Description. Head flattened, openly triangular but with a blunt tip; nostrils transversely elongated, sometimes with a

slightly elevated piece of skin at the outer edges; a short tentacle under the tip of the snout; mouth very large, with two distinct lateral flaps at its angles; one or more short, pointed appendages above the small eyes and sometimes another pair on each side of the snout under the upper lip; fingers long and slender, each ending in four tips; metacarpal tubercles absent; thighs very short; a very prominent inner metatarsal tubercle but no outer; toes broadly webbed to the tips. Skin above, shagreened and with small round tubercles and lateral line organs. Below, rugose.

Measurements. Snout-vent ♂ 135, ♀ 120.

Additional Localities. A group of petroleum geologists (López, Davey y Rubio, 1946: 123) have observed this species in the Delta Region. Ernst and Röhl do not give any special locality.

Range. Eastern Venezuela. Trinidad and the Guianas to Matto Grosso; Colombia to Perú and probably Bolivia.

Remarks. According to Röhl the common name in Venezuela is "sapo de celdas."

Pipa parva Ruthven and Gaige

Pipa parva Ruthven and Gaige, 1923, Occ. Papers Mus. Zool. Univ. Mich., No. 136: 1: Sabana de Mendoza, Venezuela; Noble, 1925, Amer. Mus. Novit., No. 164: 2; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 38, 41, pl. viii, fig. 1; Dunn, 1948, Amer. Mus. Novit., No. 1384: 8.

Protopipa parva Carvalho, 1939, Bol. Biol., *4*: 397, figs. 6b, 6c.

1 (U.M.M.Z. 55743, type) Sabana de Mendoza.
4 (U.M.M.Z. 57444-57447, prtps.) Sabana de Mendoza.
1 (M.C.Z. 9012, prtp.) Sabana de Mendoza.
47 (U.S.N.M. 115770-816) 20 km. w. Rosario, iii.42.

Description. Head depressed; snout rather pointed and projecting beyond the mouth; nostrils transversely elongated, ending laterally in two projecting tips; eyes small, their diameter much shorter than distance between eye and nostril; interorbital space broad; no dermal appendages at the tip of the snout nor in any other place on the head; arms relatively short; fingers short, with a small basal web, each ending in four short appendages; metatarsal and subarticular tubercles absent; toes fully webbed, their tips pointed; tarso-metatarsal articulation of the adpressed hind limb extends to the eye or between eye and nostril. Skin above, uniformly covered with keeled tubercles. Below, tubercular except on the lower lip.

Color. Grayish brown, tinged with yellowish and with obscure darker markings. Below, brownish yellow.

Measurements. Snout-vent ♂ 29, ♀ 34; head breadth ♂ 13, ♀ 9.5; head length ♂ 7, ♀ 6; femur ♂ 12.5, ♀ 12.3; tibia ♂ 13.5, ♀ 13.

Habits. Females with swollen backs were found to be gravid. Apparently some hormone (?) stimulates swelling prior to spawning. Some specimens only 11 mm. in length had swollen backs.

Additional Localities. El Mene, in a roadside puddle that drains into Río Cocuiza (U.S.N.M. 115818-20); Lagunillas (U.S.N.M. 11757-8); Río San Juan (U.S.N.M. 115767-9); Zulia (U.S.N.M. 128845, juv.).

Range. The arid and semiarid Maracaibo Basin and the Falcón Region. Northeastern Colombia.

Remarks. This species represents the only frog that is apparently endemic to the arid and semiarid region of northwestern Venezuela. It seems to be most closely related to *Pipa aspera* of the Guianas, but apparently there is complete discontinuity of their ranges. It is possible that in previous times an ancestral form occupied all the area from the Maracaibo Basin to the Guianas and that the range was broken by the changes that occurred during the Ice Age. Living in a medium of high specific heat, this mostly aquatic animal was able to persist in the Maracaibo Basin while failing to survive in the Coastal Range owing to the peculiar conditions existing there at the time.

I agree with Dunn (1948) in including the genera *Pipa, Protopipa* and *Hemipipa* in the single genus *Pipa.*

BUFONIDAE

Key to the Species of Bufo *Reported from Venezuela*

I. Head without bony ridges.[1]
   A. Snout truncate; canthus angular; a wedge-shaped, skin-covered ridge in front of the eye ..... *g. guttatus*

II. Head with bony ridges.[1]
   A. Upper eyelid with a hornlike dermal appendage.
      1. A lateral fringe of pointed tubercles; snout with a triangular tip ..... *ceratophrys*
   B. Upper eyelid normal.
      1. A subnasal ridge; tympanum in contact with the descending ramus of the postorbital ridge; nostrils directed upward; heel never extending to parotid ..... *g. granulosus*
      2. No subnasal ridge; tympanum not usually in contact with the descending ramus of the postorbital ridge; nostrils lateral or almost so; heel generally extending to parotid or beyond.

[1] This character does not usually work for young specimens. Such juveniles should be closely examined for the presence or absence of the supraorbital ridge. The use of the other key characters may also be necessary.

a. Angles of the jaw not projecting.
   1. Tarsal fold strong; snout not prominent, gradually inclined downward toward the front ..... *m. marinus*
   2. Tarsal fold absent; snout prominent, not gradually inclined downward toward the front.
      a. Palms and soles spinulous; metatarsal fold absent ..... *sternosignatus*
      b. Palms and soles not spinulous; metatarsal fold present ..... *typhonius alatus*

b. Angles of the jaw strongly projecting; palms and soles not spinulous; metatarsal fold present ..... *t. typhonius*

Bufo guttatus guttatus Schneider

Bufo guttatus Schneider, 1799, Hist. Amphib., *1*: 218: "India Orientali"; Boettger, 1896, Ber. Senckenb. Naturf. Ges.: LIV.

Bufo Leschenaultii Lichtenstein and Martens, 1856, Nomencl. Rept. Amphib. Mus. Berol.: 42.

7 (U.P.R. 30-36) Pto. Ayacucho, v.50.
4 (U.P.R. 37-40) Tapara, vi.50.
5 (U.P.R. 42-46) Raudal de Dios, v.50.
2 (U.P.R. 41, 47) La Culebra, 1,000 ft., v.50.
1 (M.C.Z. 17708) Sn. Fernando, 1895.

Description. Snout truncate, as long as, or very slightly longer than, the eye diameter; tongue pyriform, entire or slightly nicked behind; eye diameter greater than distance between eye and nostril; interorbital space flat, about twice as broad as an upper eyelid; canthus angular; loreal vertical, flat; tympanum distinct, ½ the eye diameter; a wedge-shaped, skin-covered ridge in front of the eye; other head ridges absent; sometimes the slight but thick supratympanic eminence appears to be an anterior extension of the parotid; parotids large, distinct, pitted, extending on the sides as far down as the lower margin of the tympanum; first finger much longer than second; fingers and toes swollen at the tips, with a thick but not very distinct lateral fringe; subarticular tubercles large, single, rounded, that of the first finger larger than the others; tarsal fold fairly prominent; metatarsal fold absent; inner metatarsal tubercle very prominent; toes taken in order from first to fifth exhibit the following phalanges free of web: 1¼, 1, 2, 3¾, 2; heel of the adpressed hind limb extends to the posterior margin of the parotid. Skin on the posterior part of the dorsum with numerous flat and very

distinctive warts; flanks and limbs warty; a series of 3 or 4 transverse rugae at the nape; a loose fold of skin on each side of the body from parotid to groin; ventral surfaces of the belly and thighs rugose and with flat warts or granules.

Color. Above, olive or wood-brown with orange brown warts; limbs, flanks and sides of the head blackish or brownish gray; parotids particolored. Below, brownish gray, uniform or more usually with scattered, round, white spots; lower jaw generally margined with white dots; limbs occasionally exhibiting dark blotches on the ventral surfaces.

Measurements. Snout-vent ♂ 47, ♀ 85; head breadth ♂ 15, ♀ 24.5; head length ♂ 14.1, ♀ 23; femur ♂ 16, ♀ 27; tibia ♂ 14, ♀ 26.

Habits. Like *B. typhonius* with which it is usually found, this species apparently prefers the leaf-covered floors of wooded areas. Unlike *B. t. typhonius,* however, it seems to be more partial to lower grounds, the species ceasing to occur at about 400 m. on the Marahuaca region, where *B. typhonius* is still abundant.

The six largest adult females (U.P.R. 30-36) were collected at night while they were crossing a road after a heavy rain. Their ovaries were completely undeveloped.

Additional Localities. Upper Orinoco (Boettger, 1896); Venezuela (Licht. and Mart., 1856).

Range. The Venezuelan Guayana and probably the Delta Region. The Guianas to northern Brasil and with all probability southeastern Colombia.

Remarks. The label with the type specimen (Berlin 3517) indicates that it was collected in Surinam by Bloch. Although the locality records are not sufficient to draw any final conclusions, I consider *Bufo glaberrimus* and *Bufo guttatus* sufficiently close structurally to be regarded as conspecific. To avoid the use of a racial name until the intergradation is confirmed appears as undesirable as to make premature use of the trinomial. These two forms are apparently not separated by any physical or faunal barrier, their ranges are allopatric and the differences they exhibit appear to be of racial value.

Bufo guttatus guttatus is apparently very sensitive to changes of latitude and altitude (see "Habits" and "Range" above) and it is possible that these factors have contributed in differentiating *glaberrimus* although this animal is found as low as 500 m. in Colombia and Ecuador. It is distinguished from typical *guttatus*

by the absence of preorbital ridges and in having a longer hind limb, the heel usually extending to the anterior half of the parotid. The skin is smooth in both forms up to a size of 35 or 40 mm. when the flat, rounded warts appear. These are generally more orange in *guttatus* than in *glaberrimus*. I have not discovered any difference in webbing between the two forms.

The rose spot in the inguinal region described by Günther for *B. glaberrimus* is found in a specimen from Macanal, Colombia (M.C.Z. 15059, 68 mm.) but not in those from Sarayaeu, Ecuador (M.C.Z. 19603-12 plus 56 dupl., largest 53½ mm.). The latter are generally dark in the anterior part of the belly and throat but the white round spots that occur in some *B. guttatus* are sometimes present in *B. glaberrimus*.

M.C.Z. specimens 3807-8, 2968 (largest 51½ mm.) from Salidero, N. W. Ecuador undoubtedly represent a race, distinguished by the variegated dorsum, greater amount of web and densely dotted ventral surface. It is not impossible that they represent the immature condition of the recently described *Bufo blombergi* Myers and Funkhouser, which might also be included in the same Rassenkreis. Boulenger (1882) mentions a *Bufo guttatus guttatus* of 177 mm. (Demerara), so it appears that the species in general may attain considerable size. Besides its normally large size, however, *Bufo blombergi* is distinguished from *glaberrimus* by several minor differences, and geographically it is disjunct, being separated by the whole Andean Range.

I believe *Bufo anderssoni* Melin (Taracúa, Uaupés R., Brasil) is a synonym of *Bufo guttatus guttatus*. This would appear from the ridge in front of the eye shown in one of the figures.

Bufo ceratophrys Boulenger

Bufo ceratophrys Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., ed. 2: 319, pl. xii, fig. 2: Ecuador.

1 (U.P.R. 253, juv.) Temiche, 4050 ft., v.50.

Description. Snout with a pointed triangular tip; nostrils somewhat raised laterally; tongue narrow, entire; eye diameter greater than distance between eye and nostril; interorbital space broader than an upper eyelid; canthus well defined; loreal almost straight; tympanum hidden; probably slight supraorbital and supratympanic ridges; parotids moderate, subovate, superficial; first finger a little shorter than second; a moderate metatarsal fringe to the tip of the outer toe; subarticular tubercles large; toes webbed at the base only; heel of the adpressed hind

limb extends to the eye. Skin above covered with small tubercles; three distinct tubercles at the angle of the mouth and several others at the ventral base of the arm; upper eyelid with a triangular dermal appendage; a lateral fringe of tubercles from parotid to groin.

Color. Above, brown with minute dark points and a dark spot on one of the sides of the dorsum; fringes along the sides of the body black-edged; limbs crossbarred. Below, uniformly light brown.

Measurements. Juv., snout-vent. 12 mm.

Habits. The only specimen was collected at night on the leaf-covered floor of very humid forest.

Range. Only known from Marahuaca in Venezuela. Eastern face of the Andes of Ecuador.

Remarks. Although very small, the specimen shows sufficient characters for its proper allocation to the species. It differs from two Ecuadorean specimens examined (M.C.Z. 19601-2, Canelos to Marañón) and from the original description in having the first finger shorter than the second, a hidden tympanum and no well-developed lateral papillae. The last two characters are probably a sign of immaturity as the smaller of the Ecuadorean specimens is similar in these respects.

So far as I am aware, the species has not been reported from the Amazonian forests between the Guayanan Cerros and the Andes. It represents the first Guayanan frog showing Andean affinities and a confirmation of similar findings in plants, birds and mammals. More abundant and adequate material of *Bufo ceratophrys* may possibly show some racial differentiation from the Andean form.

Bufo granulosus granulosus Spix

Bufo granulosus Spix, 1824, Spec. Nov. Testud. Ran.: 51, pl. xxi, fig. 2: Bahía; Boettger, 1892, Kat. Batr. Samm. Mus. Senckenb.: 39; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 38, 42, pl. viii, figs. 5, 6; Parker, 1936, Bull. Mus. Roy. Hist. Nat. Belgique, *12*: 1.

Bufo strumosus Lichtenstein and Martens, 1856, Nomencl. Rept. Amphib. Mus. Berol.: 42.

Bufo granulosus granulosus Müller and Hellmich, 1936, Wissen. Ergeb. Deutsch Gran Chaco Exped.: 13.

13 (U.P.R. 16-28) Sn. Fernando de Atabapo, vi.50.

1 (U.P.R. 29) Pto. Ayacucho, vi.50.

Description. Snout prominent, slightly longer than the eye diameter; nostrils directed upward; tongue narrow, entire; eye diameter greater than distance between eye and nostril; interorbital space about 1½ times broader than an upper eyelid; canthus curved, defined by a horny ridge that extends anteriorly as a semicircle around the nostril; loreal slightly oblique; tympanum moderate, the anterior border in contact with the postorbital ridge, the posterior margin usually obscured by granules; orbits encircled by a low but distinct, horny ridge; a horny labial and a short supratympanic ridge; parotids of moderate size but not distinctly marked; first finger not extending beyond second; a rounded palmar and a smaller and less distinct inner metacarpal tubercle; subarticular tubercles single, the second of the third finger double; edges of fingers and toes serrated; tarsal and metatarsal folds absent; toes taken in order from first to fifth exhibit the following phalanges free of web: 1⅛, 1⅛, 2-2½, 3¾, 1¼-2; heel of the adpressed hind limb does not reach the parotid. Skin above, tubercular, spiny on the sides and limbs. Male with a subgular vocal sac, and dark rugosities on the inner side of the first digit.

Color. Above, light brown or yellowish gray, with irregular dark gray markings; head ridges black. Below, yellowish gray, usually marbled with darker gray on the breast and anterior part of the belly.

Measurements. Snout-vent ♂ 46.7, ♀ 52; head breadth ♂ 14.5, ♀ 16; head length ♂ 12.1, ♀ 14; femur ♂ 10, ♀ 13; tibia ♂ 13.5, ♀ 17.

Habits. Most of the specimens were caught in amplexus in the shallow waters of a rain pool in the savannas of San Fernando. It is strange that while the *B. marinus* collected in the same locality were heavily infested with *Amblyomma dissimile*, not one of the *B. granulosus* was attacked by this tick.

Of three stomachs examined, one was empty, one contained five small snails, mud, two small stones and a piece of wood. The other had one ant, one small hemipteran and three or four pellets of unidentifiable remains.

Additional Localities. Arabopó (U.M.M.Z. 85131-2, 85133[2], 85134[2]); Caracas (U.C.V. 100; Boettger, 1892); Espino (U.C.V. 68); Lake Maracaibo (C.N.H.M. 3016[2]); Maracay (U.S.N.M. 97193-5; Lutz, 1927); Parmana (U.C.V. 10); Pto. Cabello (Licht. and Mart., 1856); Sanariapo (U.S.N.M. 80641-50); Upper Orinoco (Parker, 1936); Venezuela (Licht. and Mart., 1856).

Range. The arid and semiarid Maracaibo Basin, the northern coastal belt, the arid and semiarid sections of the Coastal Range, the Llanos and the northern half of the Venezuelan Guayana. Colombia and the Guianas to northern Argentina.

Remarks. The specimens from Arabopó (4000 ft.) have very prominent crests and perhaps should deserve racial recognition.

Bufo marinus marinus (Linné)

Rana marina Linné, 1758, Syst. Nat., ed. 10: 211: America (Restricted to Surinam by Müller and Hellmich, 1936).

Bufo agua Lichtenstein and Martens, 1856, Nomencl. Rept. Amphib. Mus. Berol.: 42; Günther, 1858, Cat. Batr. Sal. Brit. Mus.: 65.

Bufo marinus Peters, 1877, Monatsb. Akad. Wissensch. Berlin: 460; Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., ed. 2: 315; Boettger, 1892, Kat. Batr. Samm. Mus. Senckenb.: 39; 1893, Ber. Senckenb. Naturf. Ges.: 40; 1896, Ber. Senckenb. Naturf. Ges.: LIV; Stejneger, 1902, Proc. U. S. Nat. Mus., *24*: 180; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 38, 42; Alemán, 1952, Mem. Soc. Cienc. La Salle, *12*: 27, fig. 3.

Bufo marinus marinus Schmidt, K. P., 1932, Zool. Ser. Field Mus. Nat. Hist., 18: 159.

7 (U.P.R. 48-51, 76-7, 89) Sn. Fernando de Atabapo, vi.50.

1 (U.P.R. 52) Chorro Chupadero, iii.50.

Description. Snout slightly longer than the eye diameter; tongue oval or pyriform; eye diameter greater than distance between eye and nostril; interorbital space about 1½ times as broad as an upper eyelid; canthus well defined, slightly curved and sloping toward the front; loreal short, almost vertical; tympanum not very distinct on the posterior margin, ½ to ⅔ the eye diameter; head ridges well defined, the infraorbital extending obliquely to the angle of the jaw, the parietal variably distinct; a few tubercles behind the angle of the jaw; parotids large, pitted, obliquely subtriangular; a longitudinal series of tubercles from hand to elbow; first finger longer than second; a very large, flat palmar and a smaller inner metacarpal tubercle; subarticular tubercles generally single or incompletely fused, the second of the third finger double; tarsal fold strong; metatarsal absent; toes taken in order from first to fifth exhibit the following phalanges free of web: 1, 1 to 1⅔, 2, 3 to 3¾, 1½ to 1¾; the web is extended to the tips as distinct lateral fringes; heel of the adpressed hind limb extends to the parotid. Skin above and on the flanks covered with warts of irregular size; upper eyelids and sides of the head tubercular; ventral surfaces granular, the granules being sometimes tipped with a dark corneus matter. Male with a rugosity on the inner side of the first digit.

Color. Above, brown with irregular lighter and darker markings. Below, light brownish or yellowish, generally marbled with gray.

Measurements. Snout-vent ♂ 44, ♀ 79; head breadth ♂ 15, ♀ 26; head length ♂ 14, ♀ 24; femur ♂ 16, ♀ 32; tibia ♂ 17, ♀ 35.

Habits. B. marinus seems to be fairly common along the Orinoco River where its voice was often heard at night. Its presence was not detected in the Cunucunuma nor in the Upper Duida and Marahuaca regions.

Several of the specimens collected in Sn. Fdo. de Atabapo were infested with the tick *Amblyomma dissimile.* One of the animals had been so emaciated by the infestation that for a while it was taken for some other form.

Male and female specimens were collected in a shallow rain pool together with *B. granulosus.* While most of the *B. granulosus* were in amplexus, the ovaries of the adult *B. marinus* were completely undeveloped.

Additional Localities. Río Albarregas (A.M.N.H. 10501) Arabopó (U.M.M.Z. 85120[3]); Barrancas (M.C.Z. 19916, juv.); Baruta (Alemán, 1952); Calabozo (Peters, 1877); Campo del Lago, Lagunillas (U.S.N.M. 115692-8); Caracas (Boettger, 1892); Ciudad Bolívar (M.C.Z. 19114, 19 juv.); Cocollar, Cumaná, Cumanacoa (Schmidt, 1932); Duida Region (A.M.N.H. 32962); El Periquito (U.C.V. 89); El Valle (U.S.N.M. 128850-2); Espino (U.C.V. 50); Kunana, Perijá Mts. (Alemán, 1953); La Fría (U.M.M.Z. 55585*); La Guaira (U.S.N.M. 22537-8, 27800-1, 27803-6, 27796); Macuto (U.C.V. 77-8*); Maracay (U.M.M.Z. 52707-8*, Lutz, 1927); 30 km. of Maturín (U.C.V. 76); Petare (U.S.N.M. 121170); Pto. La Cruz (U.S.N.M. 121171-2); Pie del Cerro U.S.N.M. 121168); Puerto Cabello (Boettger, 1893); Sn. Antonio (U.S.N.M. 836119); Sn. Carlos (U.S.N.M. 83610); Sn. Fernando de Atabapo (U.S.N.M. 80651); Sn. Julián (U.S.N.M. 27807); Sta. Catalina (M.C.Z. 19915, 4 juv.); Sta. Elena, Bolívar (U.M.M.Z. 85121); Sta. Lucía (U.S.N.M. 121169); Tanaguarena (U.C.V. 36); Turgua (Alemán, 1952); Turgua (U.S.N.M. 129265); Upper Orinoco (Boettger, 1896); Venezuela (C.N.H.M. 43664? [3-6 juv.]; U.M.M.Z. 55583-4*; Lichtenstein and Martens, 1856; Günther, 1858; Boulenger, 1882).

Range. Probably all the physiographical provinces of Venezuela including the Andes to an elevation of 1,600 m. Texas to northern Brasil.

Remarks. No constant difference in size of parotid between specimens from northern and southern Venezuela was observed. While those of the southern animals are generally of a large size, some of the northern specimens (U.S.N.M. 121165, 121171, 27800) have glands that rival in volume any of those of the Amazonian group, with the possible exception of the larger southern specimen, an animal from San Antonio having a snout-vent length of 142 mm.

The coloration of U.S.N.M. 83610 (131 mm.) is unusual: the ventral surfaces, the under sides of the parotids, the lower jaw and the posterior part of the thighs are bright yellow and dark marbled while the throat is profusely infuscated, almost black. Dr. Cochran and I have agreed that this specimen represents *B. marinus* but in coloration it is not very different from a British Museum Pto. Cabello specimen that has been referred to *B. crucifer* (Blgr., 1882: 317, a or b). I have examined this latter animal but have excluded the species from the fauna of Venezuela until its presence is confirmed by further material.

The male *Bufo marinus* is more tubercular above, the tubercles are more spiny, and the color is usually more uniform than in the female.

Cochran, 1955, treats *Bufo paracnemis* and *Bufo ictericus* as distinct species, on the ground that the two overlap in part of their ranges (Río de Janeiro and Sao Paulo). On the east, *B. paracnemis* is said to occupy the intermediate area between northern *B. marinus* and southern *B. ictericus,* occurring in Brasil in Minas Gerais, Bahía and Pernambuco.

To the west the southward extension of *Bufo marinus* is uncertain, as records may refer to any of the related forms. However, it does not appear impossible that *Bufo marinus* may have given rise to *paracnemis* on the east and *ictericus* on the west, and that these two forms may have come together after their independent origin from a common ancestor. Anyway, there does not appear so far to be sufficient evidence against considering *paracnemis* a race of *Bufo marinus* and on that basis the trinomial is used here.

Bufo marinus andinensis Melin, 1941, was described from Roque, Perú.

Bufo pythecodactylus Werner is considered a synonym of *Bufo marinus marinus.*

Bufo sternosignatus Günther

Bufo sternosignatus Günther, 1858, Cat. Batr. Sal. Brit. Mus.: 68, pl. vi, fig. c.: Pto. Cabello, Venezuela; Córdova, Mexico (restricted to Venezuela by Boulenger, 1882); Boulenger (part?), 1882, Cat. Batr. Sal. Brit. Mus., ed. 2: 323; Boettger, 1892, Kat. Batr. Samm. Mus. Senckenb.: 39; Günther, 1901, Biol. Centr. Amer., Rept. and Batr.: 247; Nieden, 1923, Das Tierreich Anura. I: 182; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 38, 42, pl. viii, figs. 3, 4.

Bufo typhonius sternosignatus Shreve, 1947, Bull. Mus. Comp. Zool., *99*: 535.

2 (M.C.Z. 17812-3) Distrito Acosta, 29.
1 (M.C.Z. 26151) Cerro Cosme, x.39.
3 (M.C.Z. 26152, 25976-7) Paují, v. 45.
3 (U.M.M.Z. 55690-3) Sn. Esteban.
1 (U.M.M.Z. 55694) Río Bejuma.
2 (U.M.M.Z. 55695-6) Río La Mona.
1 (U.M.M.Z. 55697) Bet. Valencia and Caserío Silva.
1 (U.C.V. 16) Carayaca, xii.51.
1 (U.C.V. 28) Cerro Avila, viii.51.

Description. This species is very similar to *Bufo typhonius alatus,* from which it can be distinguished by the following characters: snout not very prominent; orbital ridges slight, the supratympanic usually well developed, the parietal absent or very indistinct; parotids subovate, not generally pointed posteriorly; hands and feet spinulous; the subarticular tubercles not different from the other spinules of palms and soles; metatarsal fold absent; heel of the adpressed hind limb extends to the posterior half of the parotid. Skin above and below very granular, occasionally coarse and spinulous especially on the sides of the body and venter. A lateral fringe of tubercles is found in some but not all individuals.

Color. This animal is usually of a reddish color when alive. In alcohol it turns brown and many specimens present a coloration very similar to that of *B. typhonius.* Some specimens are peculiarly marked with yellow and brown below.

Measurements. Snout-vent ♂ 41, ♀ 49; head breadth ♂ 14, ♀ 16; head length ♂ 12, ♀ 14; femur ♂ 16.5, ♀ 18; tibia ♂ 16, ♀ 18.

Habits. Apparently a forest animal.

Additional Localities. Caracas (Boettger, 1892); El Limón (U.S.N.M. 121173-4); Mamo, La Guaira (Lutz, 1927); Puerto Cabello (Günther, 1858; Boulenger, 1882); Venezuela (Günther, 1858; Boulenger, 1882; Nieden, 1923).

Range. The Coastal Range and Falcón Region. Reported from Colombia by Peracca, 1914 (Cafetal Camelia, nr. Angelópolis, 1820 m.), Werner, 1916 (Cañón de Tolima), and Boulenger, 1882 (Bogotá). These records probably refer to *B. typhonius alatus.* Dunn (1944) does not mention this species in his "Herpetology of the Bogotá Area" but he includes *Bufo typhonius* in the actual fauna of Bogotá.

Remarks. This species is very close to *Bufo typhonius alatus* with which it has been often confused and with which it perhaps interbreeds (though not freely) in part or all of its range. Generally it is well characterized (U.M.M.Z.) but specimens are found (M.C.Z. and U.C.V.) that are very similar to *B. typhonius,* especially in coloration and general appearance. In all these cases the palm and fingers are spinulous (not a sexual character) and the metatarsal fringe absent. The supraorbital ridge is also more prominent in *B. typhonius* and presents a pleated appearance in the region where a parietal ridge would join the supraorbital. The upper eyelid thus appears to be lower on the sides in *B. typhonius* than in *B. sternosignatus.* If a perpendicular line were to be drawn from the upper edge of the supraorbital ridge to the outside, the upper eyelid would be mostly above the line in *sternosignatus* and below it in *typhonius.*

Bufo typhonius typhonius (Linné)

Rana typhonia Linné, 1758, Syst. Nat., ed. 10: 211: America.
Bufo typhonius Boettger, 1896, Ber. Senckenb. Naturf. Ges.: LIV.
Bufo typhonius typhonius Leavitt, 1933, Copeia: 8.

7 (U.P.R. 4-10) Slopes Mt. Marahuaca, 4000 ft., v.50.
7 (U.P.R. 1-3, 11-12, 14-15) Upper Cunucunuma R., v-vii.50.
1 (U.P.R. 13) Anabén, Colombia, vi.50.
1 (U.S.N.M. 83949) Yapacana, iv.21.

Description. Snout prominent, with a more or less distinct vertical ridge at the tip, from the level of the nostrils to the edge of the jaw; tongue narrow, entire; eye diameter slightly greater than distance between eye and nostril; interorbital space twice as broad or broader than an upper eyelid; canthus well defined, curved; loreal almost vertical and a little concave; tympanum moderate, oval, ⅔ the eye diameter; preorbital and descending ramus of the postorbital ridge slight or absent; supraorbital ridge strong, anteriorly merging with the canthal, posteriorly with the very prominent supratympanic crest; parietal ridge distinct, forming a basin with the parotid; parotids prominent but small

and superficial; edge of the upper jaw studded with minute acuminate tubercles; two knob-like protuberances at the angle of the jaws; first finger not extending beyond second; tips of the fingers and toes swollen, their sides serrated; tarsal fold absent; subarticular tubercles large, usually single or fused; a row of closely set, small spinules along the outer edge of the metatarsal segment and fifth toe; toes partially webbed, the web reaching at least to the penultimate phalanx in all the toes except the third, where it does not extend beyond the proximal phalanx; heel of the adpressed hind limb extends to between parotid and tympanum. Skin above and on the sides of the head tuberecular; tubercles spiny on the flanks and limbs; a fringe of pointed tubercles from anterior border of parotid to groin; ventral surfaces granular, some of the granules spiny on the pectoral region.

Color. Above, brown, uniform or with irregular lighter and darker markings; from tip of snout to end of urostyle a yellowish vertebral stripe of varying width, on either side of which, especially in the sacral region, roundish black spots may be present or absent; flanks below the lateral fringe, occasionally lighter or darker than the dorsum. Below, yellowish brown, plain, infuscate or spotted; limbs with broad, more or less distinct crossbars.

Measurements. Snout-vent ♂ 42, ♀ 61; head breadth ♂ 14, ♀ 21; head length ♂ 14, ♀ 18; femur ♂ 17, ♀ 25; tibia ♂ 17, ♀ 24.

Habits. In life this amphibian closely resembles a dead leaf, its serrated sides and coloration contributing to make the similarity more striking. Relying on its ability to escape detection the toad usually remains motionless on the approach of danger, though sometimes taking several hops before merging again with the leaves carpeting the forest floor.

The call of this species is probably a low-toned guttural sound, similar in some respects to that of *Bufo marinus* but much shorter and lower. This noise was traced to specimens of *Bufo typhonius* on several occasions but in no instance was the animal actually seen calling.

Of 6 stomachs examined all contained ants, each of 3 held a curculionid beetle, one an isopteran, two a piece of leaf, and one a seed (probably ingested with the ants). An engorged specimen contained 30 ants, 1 mm. in length, and 2 wingless wasps, each 2 mm. long, besides other unidentifiable insect remains.

Additional Localities. Upper Orinoco (Boettger, 1896).

Range. The southern part of the Venezuelan Guayana. According to Leavitt the subspecies "extends from Venezuela, south and east through the Guianas and well south through Brasil."

Bufo typhonius alatus Thominot

Bufo alatus Thominot, 1884, Bull. Soc. Philom. Paris, *8*: 151: Obispo, Isthmus of Panama.

Bufo typhonius alatus Leavitt, 1933, Copeia: 8.

2 (U.M.M.Z. 55571-2) Bejuma.

1 (U.M.M.Z. 55573) Estación Ferrocarril, Táchira.

2 (U.M.M.Z. 55574-5, juv.) La Fría.

1 (U.M.M.Z. 85124) W. of Wiaka Piapu Mt.

1 (U.M.M.Z. 85125) Wiaka Piapu Mt.

Description. *Bufo typhonius alatus* differs from the typical form in lacking the bony protuberance at the angle of the jaws and in having a longer hind limb, the heel of the adpressed hind limb extending to the tympanum or slightly beyond. The parotid is usually narrower and pointed posteriorly.

Measurements. ♂, snout-vent 50.5; head length 15; head breadth 18; femur 23; tibia 21.

Habits. Apparently a forest animal.

Range. The Coastal Range and the northwestern slopes of the Occidental Andes, southeastern Venezuela. According to Leavitt: "as much of Central America as it inhabits and extends south and east into Venezuela and south and west into Colombia." British Guiana.

Remarks. I have been unable to confirm all the characters mentioned by Leavitt, but the absence of jaw knob and the shorter hind limbs are perhaps sufficient for racial recognition of this form. On the other hand, the distribution of the two races is quite problematic and occasional specimens of *Bufo typhonius* from the Coastal Range have well developed bony protuberances at the jaws. The Colombian frogs examined lack the jaw knobs but a trace of these is found in Panamanian examples.

Bufo typhonius alatus occurs in southeastern Venezuela and in the western part of British Guiana (U.M.M.Z. 63045, Tukeit Hill, Potaro R.) and with little doubt it will be found in the Delta Region. Specimens with all the characters of *Bufo typhonius typhonius* have been collected as far north as Dunoon (M.C.Z. 6073, about 45 km. south of Georgetown, on the margin of the Demerara R.). It is thus possible that this form passes north through the valley of the Demerara or that it moves westward along the forested north coast of South America from the eastern Guiana. If the two animals are really races of each other, it appears that the zone of intergradation is longitudinal, more or less along the Essequibo River.

LEPTODACTYLIDAE

Key to the Genera of Venezuelan Leptodactylidae

I. Sternum cartilaginous.
  A. Tympanum absent.
    1. No vomerine teeth; a tubercle on the forearm and another on the tarsus ..... *Pseudopaludicola*
  B. Tympanum present.
    1. Toes with disks, without web; vomerine teeth behind the choanae[1] ..... *Eleutherodactylus*
    2. Toes without disks, with web ..... *Ceratophrys*

II. Sternum with a bony style.
  A. Upper jaw without teeth; a small parotid gland ..... *Eupemphix*
  B. Upper jaw with teeth; no parotid gland.
    1. A large inguinal gland ..... *Pleurodema*
    2. No inguinal gland.
      a. Terminal phalanges T-shaped ..... *Lithodytes*
      b. Terminal phalanges simple ..... *Leptodactylus*

Key to the Species of Leptodactylus *Reported from Venezuela*

I. Tips of the toes dilated into small, but distinct disks; first finger not extending beyond second; 22 mm. ..... *marmoratus hylaedactylus*

II. Tips of the toes not dilated into disks; first finger longer than second.
  A. Two or more dorsal folds.
    1. Dorsal folds not more than two.
      a. Dorsal folds not extending posteriorly beyond sacrum; lateral fringes of toes slight; thighs marbled with reddish; breeding male with two breast and one thumb spine but no apparent external vocal sac; 150 mm. ..... *p. pentadactylus*
      b. Dorsal folds extending to inguinal region.
        1. Lateral fringes of toes very distinct (lateral flaps); no white longitudinal line on the posterior part of the thighs.
          a. Heels do not overlap when brought together in the anal region (tibia and femur more or less equal); anterior convexities of vomerine teeth not extending to choanae; 70 mm. ..... *rhodomystax*
          b. Heels overlap considerably when brought together in the anal region (tibia longer than femur); anterior convexities of vomerine teeth reaching the choanae and generally extending beyond their posterior margin; 73 mm. ..... *bolivianus*
        2. Lateral fringes of toes absent or faintly indicated; a white, longitudinal line along the posterior part of the thighs.

[1] *Eleutherodactylus conspicillatus* occasionally shows a trace of web in Ecuador. Some Antillean *Eleutherodactylus* also possess webs.

a. An uninterrupted, white streak along the margin of the upper jaw to the shoulder; dorsal folds dark on the anterior end; 47 mm. ..... *mystaceus*

b. Two or more bars from lower eyelid to upper lip; dorsal folds usually light colored throughout, 45 mm. ..... *poecilochilus dypticus*

2. Dorsal folds more than two;[1] spotted above.

a. Snout acuminate, well projecting beyond the mouth; lateral fringes of toes absent or slight; a longitudinal white line or close series of dots along the posterior part of the thighs; male with no breast or thumb spines but two black external vocal sacs; 40 mm. ..... *sibilatrix*

b. Snout subelliptical, not extending much beyond the mouth; lateral fringes of toes distinct; no white longitudinal line along the posterior part of the thighs; a series of white dots along the margin of the lower jaw; male with two large thumb spines; 70 mm. ..... *ocellatus*

B. No dorsal folds.[2]

1. Toes with very distinct lateral fringes; male with two thumb spines but no breast spines; color not black; 37 mm. ..... *podicipinus petersii*

2. Toes without lateral fringes; male with breast spines and one thumb spine; dorsum very rugose; color usually black; 60 mm. ..... *rugosus*

Leptodactylus marmoratus hylaedactylus (Cope)

Cystignathus hylaedactylus Cope, 1868, Proc. Acad. Nat. Sci. Phila.: 115: Napo and Marañón rivers.

Leptodactylus discodactylus Boettger, 1896, Ber. Senckenb. Naturf. Ges.: LIV.

1 (U.P.R. 102) Anabén, Colombia, vi. 50.
1 (U.P.R. 103) Marahuaca, 4,050 ft., v.50.
1 (U.P.R. 228) La Culebra, 1,000 ft., vi.50.

Description. Snout subelliptical, projecting slightly beyond the mouth; tongue narrow, oval, indistinctly nicked behind; vomerine odontoids in two short oblique series behind the choanae, their posterior extremities directed inwards; eye diameter slightly greater than distance between eye and nostril; interorbital space broader than an upper eyelid; canthus absent; loreal moderately inclined, concave; tympanum about ¾ the eye diameter; a slight supratympanic fold to the shoulder and a

[1] Specimens in which some of the folds are not easily seen are found. See "Remarks" under *L. bolivianus*.

[2] *L. podicipinus petersii* may occasionally show very slight folds on the anterior part of the back.

small, glandular ridge from shoulder to the angle of the mouth; first finger not extending beyond second, which is more or less equal to fourth; subarticular tubercles of fingers and toes very large and prominent; fingers distally swollen; toes dilated into small disks; tarsal and metatarsal folds present but indistinct; toes almost free, without lateral fringes; heel of the adpressed hind limb extends to the tympanum. Skin above, with numerous tubercles and short longitudinal folds, especially on the posterior half; a loose lateral fold from supratympanic fold to the inguinal region. Below, smooth, with a discoidal, ventral fold. Breeding male with a slight anterior ridge on the snout and a pair of longitudinal external vocal sacs that extend to the base of the humerus.

Color. Above, grayish or light brown, spotted with darker brown or black; usually a triangular spot between the eyes; limbs crossbarred. Below, uniformly white or infuscated on the throat and breast.

Measurements. ♂ snout-vent 22.5; head breadth 8; head length 8; femur 9; tibia 11.

Habits. All specimens were collected on the forest floor.

Additional Localities. Caripito (U.S.N.M. ? 2); Minapana (U.M.M.Z. 55550); Boettger's, 1896, *L. discodactylus* from the Upper Orinoco (Tiriquín and Guavamaco) was found to represent this species.

Range. The Coastal Range, the Delta Region and the Venezuelan Guayana. Southeastern Colombia, British Guiana, Surinam and south to the Napo and Marañón rivers.

Remarks. A specimen from Surinam in the M.C.Z. is of a lighter ground color and the dorsolateral spots are better defined than in the Venezuelan specimens. The frog from Marahuaca is darker than the other two animals and in this respect it is closer to a specimen from Oyapock River, Brasil. In the two frogs from Caripito in the U.S.N.M., the vomerine teeth are almost transverse, the tongue not nicked and there is no metatarsal fold. U.M.M.Z. 55550 also has transverse vomerine teeth. This specimen is a little desiccated.

This form is very similar to *L. marmoratus* (*L. dyptix*, auct.) from which it is distinguished by the presence of small disks. I have considered the two forms conspecific as one seems to represent the other in the northern part of the continent (as already noticed by Cochran, 1955: 309) and some specimens from Bolivia show an intermediate condition in disk development (M.C.Z.

15583 and others). The only obstacle to this conclusion is Melin's *L. rugosus* from Manaos, Brasil, which is considered similar to these forms and according to the author, does not have disks. He had only one specimen and it is possible that occasional specimens without disks may be found in the north. I rather suspect that this animal had small disks.[1]

The situation suggested would result in *L. marmoratus* Parker, 1835, *L. melini*, Lutz and Kloss, 1952, and probably *L. andreae* Miller, 1923, being referred to the synonymy of *L. marmoratus hylaedactylus*.

It is possible that Steindachner's (1867) figure of *Adenomera marmorata* refers to the northern form since slight swellings that could be disks are shown on the toes, and the type locality (of the figured animal) is unknown.[2] If this is the case, then the northern form should be called *L. marmoratus marmoratus* and the southern *L. m. dyptyx*. For the present it seems best to follow Parker (1932) and apply the name *L. m. marmoratus* to the southern animal.

Leptodactylus pentadactylus pentadactylus (Laurenti)

Rana pentadactyla Laurenti, 1768, Syn. Rept.: 32: Indiis, i. e. Surinam (restricted by L. Müller, 1927).

Leptodactylus pentadactylus Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 40.

5 (U.P.R. 78-82) Casurua, iv.50.

1 (U.P.R. 83) Anabén, Colombia, vi.50.

Description. Head considerably broader than long; snout subovoid; tongue widely oval, emarginate behind; vomerine odontoids in two arched series, with their anterior convexities between the choanae; eye diameter more or less equal to distance between eye and nostril; interorbital space narrower than an upper eyelid; canthus obtusely angular; loreal sloping, concave; tympanum large, obliquely oval, ⅔ the eye diameter; a supratympanic fold from posterior corner of eye to shoulder; first finger longer than second; tarsal fold strong; soles smooth; subarticular tubercles of toes conical; web absent or slight; lateral fringes of toes faintly indicated; heel of the adpressed hind limb extends to the tympanum. Skin above, finely granular; a pair of dorsolateral folds from upper eyelids to sacral region and sometimes two

[1] After this statement was written Lutz and Kloss (1952) collected in the same general region and found a small *Leptodactylus* with disks in the toes which they regard as Melin's form.

[2] There is, apparently, no statement of the type locality in the jar of the specimen figured, for Parker, 1932, does not mention it.

other loose lateral folds from supratympanic fold to groin; sides of the head granular. Belly and throat smooth; an indistinct ventral discoidal fold. Breeding male with a bicuspid or tricuspid tubercle on each side of the breast; arms swollen; a strong spine-bearing tubercle on the inner side of the first digit and numerous small spinules on each side of the throat, breast and lower parts of the humerus; no apparent external vocal sac.

Color. Above, yellowish brown or chestnut, with darker, black margined, transverse bars: a black streak along the canthus rostralis and supratympanic fold; upper lip with dark triangular spots; limbs crossbarred; a usually interrupted black line along the hind part of the forelimb; posterior part of the thighs black and salmon or pinkish yellow marbled; groin and flanks generally tinged with salmon. Belly and throat white, immaculate or marbled with brown; lower jaw dark and white barred; throat infuscate; a black ventral spot at the base of the arm.

Measurements. Snout-vent ♂ 146, ♀ 160; head breadth ♂ 57, ♀ 60; head length ♂ 49, ♀ 51; femur ♂ 54, ♀ 51; tibia ♂ 64, ♀ 65.

Habits. This species occurs commonly along the Cunucunuma River where the Maquiritare Indians use it as food. Its voice was often heard at night but all our specimens were brought by Indians, who apparently objected to one of their greatest delicacies being thrown into a jar of formalin, preferring to bring a few themselves rather than permitting the collection of too many. A large foam nest attributed to this species by the Indians was found in a small depression between the roots of a tree. There were neither eggs nor tadpoles present and the nearest water was that of the river about 200 yards away.

Of several stomachs examined, two were empty, one had the remains of a small frog, many large pieces of leaves and a few legs and other insect remains; another contained a huge scorpion, by whose sting the predator was apparently unaffected (it was puncturing the stomach wall) and several sticks, leaves and other unidentifiable remains.

Additional Localities. 1½ hr. above Paso del Diablo (A.M.N.H. 23164).

Range. The Venezuelan Guayana. The species extends from Central America and Trinidad to Perú and southern Brasil. The race goes as far south as Ceara.

Remarks. It would be interesting to discover how this species reached Central America as it has not yet been discovered in

northern Venezuela nor in the Llanos. There is a specimen from the Andes of Bogotá (not examined) in the collection of the American Museum.

Leptodactylus rhodomystax Boulenger

Leptodactylus rhodomystax Boulenger, 1883, Proc. Zool. Soc. London: 637, pl. lviii, fig. 2: Yurimagas, Huallaga River, Northern Perú.

1 (A.M.N.H. 23175) Esmeralda, 28.

Description. Head a little broader than long; snout subovoid to rounded; tongue with a slight notch behind; vomerine odontoids in two very slightly arched series behind the choanae; eye diameter equal to distance between eye and nostril; interorbital space more or less of the same breadth as an upper eyelid; tympanum distinct, ¾ the eye diameter; canthus flat, indistinct; loreal sloping, slightly concave; a thick supratympanic fold from lower eyelid to shoulder; an elongated glandule at the angle of the mouth; first finger longer than second but much shorter than third; subarticular tubercles moderate; a strong tarsal fold and a very pronounced flap from outer metatarsal tubercle to tip of the last toe; other toes similarly fringed and with a short web (2, 2, 3, 4, 4); inner metatarsal tubercle more protuberant and elongated than the outer; heel of the adpressed hind limb extends to middle of the eye. Skin above somewhat rugose, with two glandular folds from posterior corner of the eye to inguinal region; flanks with several rounded glandules. Below, smooth.

Color. Above, vinaceous-brown, the dorsolateral folds and some of the lateral glandules of a blackish or dark gray color; upper lip light, vermiculated or spotted with darker; apparently a canthal and a supratympanic streak; anterior and posterior aspect of the thighs marbled with brown and black, the rest of the limbs with obscure dark spots. Below, yellowish-white; lower lip grayish, dotted with white; probably there were white spots on the throat and pectoral region; distal portion of the hind limbs speckled with dark.

Measurements. ♀ snout-vent 70; head breadth 24; head length 25.5; femur 33; tibia 34.5.

Range. The Venezuelan Guayana. The species is said to occur in British Guiana, Colombia, Brasil and Perú.

Remarks. I have decided to follow rather uncritically Dr. Dunn's determination of this specimen until topotypical material is available for comparative purposes. From a glance I took at

specimens of *L. stictigularis* Noble (= *L. rhodomystax,* fide Parker, 1935) from British Guiana and at a specimen from Río Uaupés determined as *L. rhodomystax* in A.M.N.H. (39791), I got the impression that this animal is none of them and that if the latter is the real *rhodomystax* then *stictigularis* is not an absolute synonym. The Río Uaupés form seems to me identical with the animal pictured and described by Lutz (1926: 149, pl. xxxii) and I do not think it represents *L. mystaceus* as thought by Parker (*op. cit.*). At least it is much larger than any *mystaceus* I have seen and the color has a reddish tinge not found in that species. The animal here described has very strongly developed lateral fringes on the toes, the second finger is only a little shorter than, and the third much longer than, the first. I noted that the first finger of *L. stictigularis* is about as long as the third and the second is only ⅔ the first. The lateral fringes are present but not even half as prominent as in the Venezuelan animal.

Leptodactylus bolivianus Boulenger

Leptodactylus bolivianus Boulenger, 1898, Ann. Mus. Civ. Stor. Nat. Genova, *19*: 131: Barranca and Misiones Mosetenes, Bolivia; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 39, 45, pl. x, figs. 10, 11; Schmidt, K. P., 1932, Zool. Ser. Field Mus. Nat. Hist., *18*: 160; Shreve, 1947, Bull. Mus. Comp. Zool., *99*: 535; Alemán, 1952, Mem. Soc. Ciene. Nat. LaSalle, *12*: 26.

Leptodactylus ocellatus Stejneger (not Linné), 1902, Proc. U. S. Nat. Mus., *24*: 180.

2 (U.P.R. 84, 86) Anabén, Colombia, vi.50.
1 (U.P.R. 85) Sn. Fdo. de Atabapo, vi.50.
2 (U.P.R. 87-8) La Culebra, 1000 ft. iv.50.
4 (M.C.Z. 25985-8) Paují, iv-xi.45.
1 (M.C.Z. 26143) Riecito, 29.

Description. Head usually longer than broad; snout subelliptical; tongue broad, oval, emarginate behind; vomerine odontoids in two arched series behind the choanae, their anterior convexities extending sometimes to the middle of the inner margin of the latter; eye diameter shorter than, or equal to, distance between eye and nostril; interorbital space equal to an upper eyelid; canthus rounded but distinct; loreal somewhat sloping, concave; tympanum large, circular, distinct, ¾ the eye diameter; first finger longer than second; subarticular tubercles of fingers large, rounded, of toes, oval or conical; soles mostly smooth; toes very

slightly webbed, the web extending to the tips as conspicuous lateral fringes; heel of the adpressed hind limb extends to the eye. Skin above, smooth, with two dorsolateral folds from upper eyelid to groin; a supratympanic fold from posterior corner of the eye to shoulder; also occasionally present is a slight pair of lateral folds; an elongated glandular fold at the angle of the mouth. Below, smooth, with a discoidal fold on the belly. Arms in the breeding male swollen and bearing one or two tubercles on the inner side of the first digit.

Color. Above, dark or light gray, generally marked with dark blotches on the posterior half; a black canthal streak which continues behind the eye as a temporal spot to the shoulder; a few black blotches sometimes follow this spot on the anterior part of the flanks; dorsal folds usually black-edged; between them a dark, central marking broadens in front to form an anteriorly truncate spot between the eyes; tympanum chestnut; upper lip light, sometimes with dark, vertical spots; posterior part of the flanks near the inguinal region with black blotches and smaller white spots; posterior aspect of the thighs marbled; rest of the hind limb crossbarred, the bars being black and very distinct on the hidden portions of the tibiae. Below, uniformly grayish white or slightly marbled with gray; lower lip with round, white dots.

Measurements. Snout-vent ♂ 72, ♀ 73; head breadth ♂ 24.5, ♀ 24; head length ♂ 25, ♀ 25.3; femur ♂ 31, ♀ 31; tibia ♂ 39, ♀ 41.

Habits. Some of the specimens were collected in a partially inundated, largely treeless area near the river; others were found in a trail passing through very tall grass about 50 feet from the river edge and 25 from the forest.

Of three stomachs examined, one contained a pentatomid bug, a spider and a small beetle. The second had one complete beetle and other beetle remains, while the third was empty.

Robinson (in Stejneger, 1902) describes the breeding habits of this frog: "This frog makes a noise like the sound of water gurgling from a bottle, only it is a single note and louder. They make in the weeds in the water's edge a bird's nest of bubbles or more like the whipped-up white of eggs and even more gelatinous. The depression in the center goes entirely through and the frog sits in the water below, with its nose and eyes appearing in the bottom of the nest."

Additional Localities. Baruta (Alemán, 1952); Caracas (Lutz, 1927); nr. Carapa (U.S.N.M. 80613-4); Casiquiare, 8 mi. below Orinoco (A.M.N.H. 23167); Cocollar (Schmidt, 1932); Encontrados (C.N.H.M. 2603); Higuerote (U.C.V. 51); La Fría (U.M.M.Z. 55582); La Guaira (U.S.N.M. 22539, 27793 [= Stejneger, 1902]); La Trinidad (C.N.H.M. 28114, 35988-9); Maracay (Lutz, 1927); Palma Sola (U.M.M.Z. 55581); Parmana (U.C.V. 66); Río Su. Esteban (U.M.M.Z. 55580); Sosa (U.C.V. 80); Sucre (C.N.H.M. 17769-71 [= Schmidt, 1932?]); Turgua (Alemán, 1952); Turmero (C.N.H.M. 2734).

Range. Probably found in all the physiographical provinces of Venezuela. Central America to Perú, Bolivia and Brasil.

Remarks. Specimens from north of the Andean System seem to have a lighter ground color, more blotches on the posterior part of the body and flanks and more numerous and distinct crossbars on the limbs. In the two Culebra specimens the dorsum is somewhat rugose and with small scattered tubercles and the ventral surfaces are lightly marbled. No appreciable difference has been found between animals from southern Venezuela and a topotypical specimen.

Boulenger describes the male of the species as having a single tubercle on the inner finger, apparently a sign of immaturity, for sexually mature specimens have two tubercles.

This species is allied to *Leptodactylus ocellatus* from which it can be distinguished by its coloration, by having not more than two dorsal folds, and by the lesser development of the forelimbs in the breeding male. An occasional specimen is found in which these characters do not work. The greater breadth of the interorbital space in *L. bolivianus* may be useful in these doubtful cases.

A specimen from Colombia deposited at the Museum of Vertebrate Zoology does not seem to have any dorsal folds.

Leptodactylus mystaceus (Spix)

Rana mystacea Spix, 1824, Spec. Nov. Test. Ran.: 27, pl. iii, fig. 1, 3: Bahía.
?Leptodactylus poecilochilus Boettger, 1896, Ber. Senekenb. Naturf. Ges.: LIV.

1 (U.P.R. 91) Anabén, Colombia, vi.50.
2 (U.P.R. 37-38) Marahuaca, v.50.

Description. Head broad at the base; snout subovoid, extending well beyond the mouth; tongue oval, emarginate behind; vomerine odontoids in two slightly arched series behind the

choanae, fairly close together and extending outwards to about the middle of the posterior margin of the latter; eyes dorsally depressed, their diameter equal to distance between eye and nostril; interorbital space somewhat broader than an upper eyelid; canthus not very distinct; loreal oblique, concave; tympanum distinct, ¾ the eye diameter; a supratympanic fold from posterior corner of eye to shoulder; an elongated gland at the angle of the mouth; first finger longer than second; tarsal fold slight, metatarsal absent or faintly indicated; soles slightly tubercular; subarticular tubercles of toes and fingers large, prominent; toes free or with a rudimentary web; lateral fringes of toes faintly indicated; heel of the adpressed hind limb extends to the eye. Skin above and on the flanks and limbs shagreened; a pair of dorsolateral folds from upper eyelid to groin. Belly and throat smooth; thighs granular; a ventral discoidal fold. Breeding male with a sharp anterior ridge in front of the snout and two external vocal sacs indicated by a pair of shallow pigmented grooves at the sides of the throat.

Color. Above, brown, with the dorsal folds of a black or dark color on the cephalic and light on the caudal extremities; a well defined black canthal, and supratympanic streaks; upper lips margined with dark; a white "mustache" above the dark line of the upper lip extends posteriorly to the shoulder; tympanum chestnut; a dark saddle-shaped marking between the eyes; a broad, dark brown line along the posterior surface of the forelimbs and a white, slanting one on the anterior side of the humerus; thighs with a dark streak or series of spots along their anterior border and a white, dark-edged longitudinal line along their hinder aspect; hind limbs with broad crossbars; hidden portions of the tibiae with well-defined black spots. Below, white; the throat, chest and limbs sometimes speckled with brown.

Measurements. Snout-vent ♂ 47, ♀ 48.5; head breadth ♂ 17, ♀ 17.3; head length ♂ 17, ♀ 17; femur ♂ 21, ♀ 22; tibia ♂ 24, ♀ 25.5.

Habits. Of two stomachs examined, one was empty and the other contained a cricket and a seed.

The female specimen in the collection is full of very large, yellow eggs.

Additional Localities. Boettger's, 1896, *L. poecilochilus* from Upper Orinoco may refer to this species.

Range. The Venezuelan Guayana. Southeastern Colombia and British Guiana to southern Brasil.

Remarks. Specimens from Río Humboldt, Brasil and Buenavista, Bolivia, do not show any appreciable difference from the Venezuelan animals.

The species is related to *L. poecilochilus* from which it can be distinguished by the different coloration of the snout and its tubercular soles. The white coloration of the loreal area is more extensive dorsally in *L. poecilochilus* and not narrow and well defined as in *L. mystaceus.* This "mustache" is not interrupted by spots or lines in *L. mystaceus.*

Leptodactylus poecilochilus dypticus Boulenger

Leptodactylus dypticus Boulenger, 1918, Ann. Mag. Nat. Hist., (9) *2*: 431: Andes of Venezuela; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 39, 45, pl. x, figs. 12, 13; Shreve, 1947, Bull. Mus. Comp. Zool., *99*: 535.

2 (M.C.Z. 25989-90) Paují, iv, xi.44.
1 (U.M.M.Z. 55554) Palma Sola.
1 (U.M.M.Z. 57483) Sabana de Mendoza.
1 (U.M.M.Z. 57484) Guachi.

Description. Head broad at the base; snout subovoid, longer than the eye diameter; tongue oval, emarginate behind; vomerine odontoids in two long, slightly arched and close-together series behind the choanae, their anterior convexities not extending beyond the horizontal of the posterior margin of the latter; eye diameter equal or slightly greater than distance between eye and nostril; interorbital space equal to or narrower than an upper eyelid; canthus indistinct; loreal sloping, slightly concave; tympanum distinct, ⅔ the eye diameter; a supratympanic fold from lower eyelid to shoulder; an elongated glandule at the angle of the mouth; first finger much longer than second; fingers and toes distally swollen; tarsal fold not distinct, metatarsal slightly indicated; inner metatarsal tubercle small, subarticular tubercles large and very prominent; soles usually smooth or nearly so; toes free, without lateral fringes; heel of the adpressed hind limb extends to between eye and nostril. Skin above, smooth, with two dorsolateral folds that extend from upper eyelid to groin; another pair of loose folds along each side of the body; flanks with small, scattered warts. Below, smooth, with a discoidal fold on the belly.

Color. Above, gray or light brown, with a pair of dark, elongated spots behind the scapulae, at the edge of the dorsolateral folds; a distinct, black canthal streak that does not extend to the eye; a black supratympanic streak; a black, broad, anterior and a narrow posterior line from eye to dark-margined upper

lip; tympanum chestnut; interorbital space with a narrow transverse line; dorsolateral folds light colored; forelimbs crossbarred; thighs with a broad dark streak or series of large spots along the anterior border, their posterior aspect with a white, dark-edged, longitudinal line; sometimes the thighs are closely crossbarred above; hidden portions of the tibiae with very distinct black bars. Below, milky white; lower lip edged with a dark grayish line which disappears anteriorly.

Measurements. ♀ Snout-vent 45; head breadth 16; head length 16; femur 12; tibia 14.

Additional Localities. Maracay (Lutz, 1927).

Range. The Coastal Range, the Falcón Region, the Maracaibo Basin and the lower slopes of the Western Andes. Northeastern Colombia.

Remarks. The number of specimens available have been insufficient to determine whether the Venezuelan form is really identical with the Colombian-Central American *poecilochilus*. They clearly show, however, that the two are very closely related and probably conspecific.

Four of the five Costa Rican frogs examined are of the "*quatrilineatus*" type which is said to be the least common within the range of *L. p. poecilochilus* (Dunn, 1940: 106). M.C.Z. 7997 from the same locality and collection as the "*quatrilineatus*" group is mostly plain above and similar in many respects to M.C.Z. 16069 from Río Frío, Colombia and to the Venezuelan animals, for which the striped coloration has never been reported. Apart from this, little is left to separate the two forms. It appears that *L. p. poecilochilus* is more spotted on the dorsum, has better defined spots between upper lip and eye and a broader white line along the posterior aspect of the thighs. The canthal streak seems to extend to the eye in most *poecilochilus* while in *dypticus* it stops before reaching the orbit. It would be necessary to have more non-"*quatrilineatus*" specimens to determine if these differences really exist and if there are any others.

M.C.Z. 25989 has a rosy tinge on the flanks and thighs and both 25989 and 25990 are of a light gray color, differing in this respect from the U.M.M.Z. specimens, in which the color is brown. This may be due to differences in the preservatives used. In 25990 the transverse bars of the thighs are narrow and numerous while in the other specimens they are indistinct or absent.

The male *L. p. dypticus* from Río Frío, Colombia (37.5 mm.) has a very pronounced ridge in front of the snout. U.M.M.Z.

57484 looks somewhat different on account of its unusually narrow head but it agrees in other characters.

In the files of the American Museum of Natural History I noticed that there are one or more specimens from Medellín, Colombia, determined as *L. dypticus,* but probably representing the typical form. I believe the Argentinian specimens mentioned by Dunn (*op. cit.*) refer to some other species, perhaps *L. mystaceus.*

Leptodactylus sibilatrix (Wied)

Rana sibilatrix Wied, 1824, Abbild. Naturg. Bras., No. 4: 5, pl. 5, fig. 2: East Coast of Brazil.

Cystignathus typhonius Lichtenstein and Martens, 1856, Nomencl. Rept. Amphib. Mus. Berol.: 39.

Leptodactylus mystacinus Boettger (part: not Burmeister), 1892, Kat. Batr. Samm. Mus. Senckenb.: 30; Nieden (part?), 1923, Das Tierreich. Anura I: 485; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 39, 45.

Leptodactylus typhonius Boettger, 1892, Kat. Batr. Samm. Mus. Senckenb.: 31; 1896, Ber. Senckenb. Naturf. Ges.: LIV; Lutz, A., Mem. Inst. Osw. Cruz, *20*: 39, 46.

9 (U.P.R. 92-100) Pto. Ayacucho, iii, vi.50.

Description. Head longer than broad; snout acuminate, projecting well beyond the mouth; tongue oval, emarginate behind; vomerine odontoids in two slightly arched series close together behind the choanae; eye diameter equal or slightly greater than distance between eye and nostril; interorbital space more or less equal to an upper eyelid; canthus absent; loreal sloping, slightly concave; tympanum distinct, ⅔ the eye diameter; a slight supratympanic fold from lower eyelid to shoulder; an elongated gland at the angle of the mouth; first finger longer than second; tarsal fold usually slight; metatarsal fold may be faintly indicated; soles with minute, flat granules; toes free, their lateral fringes absent or faintly indicated in very dry specimens; heel of the adpressed hind limb extends to the eye. Skin above, smooth, with several (usually more than 5) dorsal, longitudinal folds. Below, smooth, with a distinct discoidal fold on the belly. Male with two lateral external vocal sacs; arms not enlarged; inner side of the first digit without tubercles.

Color. Above, brown or tan, spotted with darker brown markings; one or two spots generally present between the eyes; tympanum chestnut, with a white rim; limbs crossbarred; posterior surface of the thighs marbled, but with a well defined, longitudinal, white line or continuous series of dots along its lower part. Belly milky white; vocal sacs pigmented with dark gray or black.

Measurements. Snout-vent ♂ 42.5, ♀ 39.5; head breadth ♂ 14, ♀ 13.1; head length ♂ 15, ♀ 15; femur ♂ 18.2, ♀ 18.5; tibia ♂ 24, ♀ 22.

Habits. Several specimens were collected at night, after heavy rain, in the shallow pools of a grassy (2 or 3 inches grass) area. Others were collected in tall grass while calling at night. The voice is probably a short "huit" sound, as described by Lutz for *L. mystaceus.*

Additional Localities. Arabopó (U.M.M.Z. 39757, 85201[5], 85205); Caracas (Senckenb. Mus. 1244b [= Boettger, 1892: 39, part]); Chícare (Caicara?) (U.S.N.M. 36369-70); Espino (U.C.V. 69); 10 km. from La Pascua (U.S.N.M. 128839); Maracay (Lutz, 1927); Pie del Cerro (U.S.N.M. 121148); Roraima (A.M.N.H. 39752); Sabana de Mendoza (U.M.M.Z. 75478); Sta. Elena, Bolívar (U.M.N.Z. 85204); Sosa (U.C.V. 86); Upper Orinoco (Boettger, 1896); Wiaka Piapu, 5000 ft. (U.M.M.Z. 85200[2]).

Range. The Maracaibo Basin, the Coastal Range, the Llanos and the Venezuelan Guayana. Northern Colombia to northern Argentina.

Remarks. Specimens from Sabana de Mendoza are of a much darker ground color; the spots are rather obscure and the dorsal folds are absent or reduced to two slight ones. Animals from Sta. Marta, Colombia, are not very different from those of the rest of Venezuela, but a lot from Magdalena Valley, Colombia, have a somewhat rugose skin and as dark a color as the specimens from Sabana de Mendoza. These last animals probably represent a subspecies.

L. sibilatrix can be confused with young *L. ocellatus*, from which it can be distinguished by its more projecting and acuminate snout, by the absence of white dots on the lower lip and of lateral fringes on the toes and by the presence of a longitudinal white line on the posterior part of the thighs. The breeding male of *L. ocellatus* has enlarged forearms and two tubercles on the inner side of the first digit but no apparent external vocal sacs.

Leptodactylus ocellatus (Linné)

Rana ocellata Linné, 1758, Syst. Nat., ed. 10: 211: America.

Cystignathus ocellatus Lichtenstein and Martens, 1856, Nomencl. Rept. Amphib. Mus. Berol.: 39.

Leptodactylus ocellatus Boettger, 1893, Ber. Senckenb. Naturf. Ges.: 40; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 45.

2 (U.M.M.Z. 83718) Sn. Fdo. de Apure.
1 (U.M.M.Z. 89583) Río Amana, nr. Maturín.
1 (U.C.V. 11) Parmana, vi.51.
4 (U.C.V. 31-33, 35) El Sombrero, viii.51.

Description. Head longer than broad; snout subelliptical; tongue broad, oval, emarginate behind; vomerine odontoids in two arched series behind the choanae, their anterior convexities extending sometimes to the middle of the inner margin of the latter; eye diameter equal to distance between eye and nostril; interorbital space narrower than an upper eyelid; canthus absent; loreal somewhat sloping, concave; tympanum distinct, ¾ the eye diameter; a supratympanic fold from posterior corner of eye to shoulder and a thick glandular ridge from this to the angle of the mouth; first finger longer than second; tarsal fold strong, metatarsal indistinct or absent; soles mostly smooth; subarticular tubercles of fingers large and rounded, of toes, conical; toes slightly webbed, the web extending to the tips as conspicuous lateral fringes; heel of the adpressed hind limb extends to the eye. Skin above, smooth, with several (usually more than 5) longitudinal folds; flanks sometimes with small, rounded glandules. Below, smooth, with a discoidal fold on the belly. Arms in the breeding male much swollen and bearing two blunt tubercles on the inner side of the first digit.

Color. Above, light brown spotted with a darker shade of brown; occasionally some of the spots are elongate and follow the dorsal plicae for part of their length; a usually symmetrical spot between the eyes; a canthal and a temporal streak; thighs marbled behind; hind limbs crossbarred. Belly and throat white, uniform, mottled or dusted with brown; a series of white dots along the margin of the brown pigmented lower jaw. Throat may have white spots on a brownish background.

Measurements. Snout-vent ♂ 71.5, ♀ 60; head breadth ♂ 25.5, ♀ 21; head length ♂ 24, ♀ 22; femur ♂ 31, ♀ 25; tibia ♂ 34, ♀ 28.5.

Additional Localities. Puerto Cabello (Boettger, 1893); Venezuela (Licht. and Mart., 1856).

Range. The coastal belt and the Llanos. So far as I am aware, the records given here represent the most northerly for the species. To the south it extends as far down as Argentina, where a local race (*L. ocellatus bonariensis*) is recognized by Cei (1956).

Remarks. See remarks under *L. sibilatrix* and *L. bolivianus.*

Leptodactylus podicipinus petersii (Steindachner)

Platymantis petersii Steindachner, 1864, Verhandl. Zool. Ges. Wien.: 254, pl. xvi, figs. 2, 2a, 2c: Marabitanas, Brasil.

Leptodactylus caliginosus Boulenger (not Girard), 1903, Ann. Mag. Nat. Hist., (7) *11*: 481; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 39, 45, pl. xi, figs. 14, 15; Shreve, 1947, Bull. Mus. Comp. Zool., *99*: 536.

1 (U.P.R. 101) Sn. Fdo. de Atabapo, vi.50.
6 (M.C.Z. 26144-6 — 3 dupl.) Cerro Cosme, x.30.
1 (M.C.Z. 2970) Mérida.
1 (U.M.M.Z. 55551) Lagoon Palma Sola.
2 (U.M.M.Z. 55552-3) La Fría, rt. fork R. Oropito.

Description. Head broader than long; snout subovoid; tongue oval, slightly nicked behind; vomerine odontoids in two little arched series behind the choanae, their anterior convexities not extending beyond the horizontal of the posterior margin of the latter; eyes small, their diameter equal to distance between eye and nostril; interorbital space more or less equal to an upper eyelid; canthus indistinct; loreal sloping, not concave; tympanum circular, ¾ the eye diameter; first finger longer than the second; subarticular tubercles moderate; a strong tarsal and a distinct metatarsal fold; metatarsal tubercles small but distinct; soles usually tubercular; toes slightly webbed, the web extending to the tips as very conspicuous lateral fringes; heel of the adpressed hind limb extends to the posterior corner of the eye or a little beyond. Skin above, with small tubercles on the posterior ⅔; upper eyelids usually granular; flanks sometimes with round and elongated glandules. Ventral surfaces of the belly and throat smooth; an indistinct discoidal fold on the belly. Breeding male with two pointed tubercles on the inner side of the first digit; no distinct external vocal sac.

Color. Above, grayish brown with occasional darker spots; a dark, anteriorly truncate spot between the eyes is generally limited in front by a light transverse line; snout lighter than the body color; a light, not very distinct, slanting line from lower eyelid to angle of jaw and usually some others in front of these; hind part of the thighs obscurely marbled with light; a not very well defined light line along the lower posterior aspect of thighs; limbs crossbarred, sometimes indistinctly. Ventral surfaces dirty white, sometimes marbled or freckled with brown on the throat, breast and distal portions of the hind limbs; lower lip usually margined with white dots.

Measurements. Snout-vent ♂ 37, ♀ 41; head breadth ♂ 13, ♀ 14; head length ♂ 12.5, ♀ 14; femur ♂ 18, ♀ 17; tibia ♂ 20, ♀ 18.5.

Additional Localities. Albarregas River (A.M.N.H. 10517-9); Arabopó (A.M.N.H. 39758-9; U.M.M.Z. 85197[4]); Bonicito River (U.M.M.Z. 100056); Carayaca (U.C.V. 17); Caripito (U.S.N.M. 17088-9); Casiquiare, 8 mi. above Capibara (A.M.N.H. 23166); El Limón (U.S.N.M. 121146); Los Canales, Planta Eléctrica de Naiguatá (U.S.N.M. 128838); ?Maracay (Lutz, 1927); Mérida (A.M.N.H. 3136; U.S.N.M. 118176; Boulenger, 1903); Petare (U.S.N.M. 121147); Pie de Avila (U.C.V. 110); Pto. Ayacucho, nr. Venado (U.S.N.M. 80666, 80671-5); Río Cotiza, Camino de Galipán (U.S.N.M. 117526, 121137); Río Pescado (A.M.N.H. 23182); Roraima (A.M.N.H. 39753).

Range. All the physiographical provinces of Venezuela, including the Andes to an elevation of at least 1600 m. The species extends from Colombia and Trinidad to Buenos Aires. The race is found in the northern part of the continent and as far south as Bolivia and Minas Gerais.

Remarks. Dr. Cochran has found (1955:328) that *Leptodactylus caliginosus* Girard is a strict synonym of *Leptodactylus ocellatus* (Linné). Specimens from southern Brasil referred to *caliginosus* by various authors are considered by her to be identical with *L. podicipinus* Cope. Such being the case, the name available for the northern form which has been called *L. caliginosus* seems to be *Leptodactylus petersii* (Steindachner).

For the study of *podicipinus podicipinus* and *podicipinus petersii,* I have examined a total of 155 specimens from Colombia, Venezuela, the Guianas, Brasil, Bolivia and Ecuador, and for comparison with these I had a few examples of *melanonotus* from Central America and *validus* from Trinidad.

The change from *petersii* to *podicipinus* seems to occur in Bolivia on the west and in Minas Gerais on the east, but the nature of the change and the direction it follows is not easy to see without resort to statistical measures. There are sufficient specimens in the different museums and it is hoped that this type of analysis can be done in the near future. Meanwhile, the following observations may be helpful. *L. p. podicipinus* differs from *L. p. petersii* in its smaller size (average for 15 adult specimens, 10 ♀♀, 5 ♂♂, 32.2 for *L. p. petersii* and 29.5 for *L. p. podicipinus*), in having a shorter femur (the length of the femur equals half the distance from anus to interorbital line in *podicipinus* and from

anus to the middle of the snout [Bolivia] or beyond the tip in *petersii*), in having an interorbital spot that extends much farther back on the dorsum, in the characteristic white spotting on the venter and in lacking a longitudinal, white line along the posterior part of the thighs and a well defined supratympanic fold. *L. p. petersii* has a broader head and usually transverse bars on the upper surface of the hind limbs and brown freckles on the distal lower surface.

In Bolivia, typical *L. p. podicipinus* occurs in Cachuela Esperanza and Rurrembaque but in the Upper Beni (farther south!) it occurs as a larger form, many specimens lose the ventral spots, and the longitudinal, white line in back of the thighs comes out. There is a form in Buena Vista which I think should be referred to the northern race though somewhat divergent from it and possessing certain characters of its own (long, narrow head; gray color; 2 black spots on the sides of the anus). It seems to me that the change from one race to the other is not along a well-defined latitudinal boundary; instead there are many finger-like projections of one race into the "supposed" range of the other. Along the eastern base of the Andes and along the lower course of Río Beni, typical *podicipinus* occurs. However, the more southern Upper Beni specimens show some transitional characters toward the eastern variant occurring in Buena Vista and the latter toward the northern form, which probably meets *podicipinus* on the east and north of this region. In Maracaju, Salobra and Corumbo in Matto Grosso only *podicipinus* seems to occur, while in Minas Gerais both forms exist. *L. natalensis* should perhaps by synonymized with *L. p. petersii*.

In the north, *L. p. petersii* has undergone considerable modification in some places. In Colombia, for example, the species seems to attain enormous (relatively speaking) proportions, while in the Upper Rupununi of British Guiana, specimens with very dark dorsal coloration and densely reticulated ventral surfaces occur. This ventral pattern is found in specimens from other places but in this region it is very distinct and apparently general (A.M.N.H. 46437, 27 untagged specimens).

Leptodactylus validus seems to me referable to this same species and perhaps even *Leptodactylus melanonotus* may be included in the Rassenkreis but these problems are left until a complete study can be made.

Alemán's, 1952, *Leptodactylus* species *aff. petersii* from Turgua may be referable to this form.

Leptodactylus rugosus Noble

Leptodactylus rugosus Noble, 1923, Zoologica (N.Y.), *3*: 297: British Guiana; Parker, 1936, Bull. Mus. Roy. Hist. Nat. Belgique, *12*: 2.

7 (U.P.R. 190-1, 62-6) Cerro Turuma Chica, vi.50.

6 (U.P.R. 53-4, 67-70) Pto. Ayacucho, iii.50.

7 (U.P.R. 55-61) Sanariapo, iii.50.

5 (U.P.R. 71-5) Casa de Julián, iv.50.

Description. Snout subovoid, longer than the eye diameter; tongue oval, entire or very slightly nicked behind; vomerine odontoids close together and forming two arched groups behind the choanae, their anterior convexities usually extending to the middle of the inner margin of the latter; eye diameter greater than distance between eye and nostril; interorbital space narrower than an upper eyelid; canthus depressed; loreal sloping, concave; tympanum distinct, circular, ¾ the eye diameter; a supratympanic fold from posterior corner of eye to shoulder; one or two glandular tubercles between angle of jaw and arm; first finger longer than second; fingers and toes distally swollen; tarsal fold slight to moderate, metatarsal absent; an elongate oval inner and a small, rounded, outer metatarsal tubercle; toes practically free, without lateral fringes; heel of the adpressed hind limb extends to the posterior corner of the eye. Skin above with irregularly scattered warts of unequal size; flanks usually with numerous round or elongated glandules. Below, smooth, except for the hind part of the thighs and sides of the belly which are grandular; a ventral discoidal fold. Breeding male with a pair of spines on the breast, two pigmented external vocal sacs, numerous spinules on the chin and a pointed tubercle on the inner side of the first digit.

Color. Above, black or brownish gray, sometimes obscurely spotted with a darker shade; several light colored lines radiate from eye to upper lip; a distinctive, white interorbital line and occasionally a pair of vermicular, whitish ones originate in the posterior corner of the eye and converge posteriorly to separate again and form an hour-glass figure on the anterior part of the dorsum; hinder part of the thighs obscurely marbled; limbs crossbarred, the bars not clearly delimited in some specimens. Belly and lower surfaces of limbs white or brownish, uniform or somewhat marbled; throat generally infuscate in the male.

Measurements. Snout-vent ♂ 67, ♀ 67; head breadth ♂ 25, ♀ 25; head length ♂ 24, ♀ 22.5; femur ♂ 31, ♀ 29; tibia ♂ 30, ♀ 31.5.

Habits. The voice of this species is very similar to the noise produced when a stone is thrown into a quiet pool of water. It is usually heard at dusk in the stony places which the animal generally inhabits. Many of the specimens were collected under a large rock on top of a hill of bare granite (Turuma Chica) where the dampness and the small, stingless bees that nested under the stone provided a clear motive for their site preference. All the stomachs of these specimens and of some of those collected elsewhere were full of these bees. Evidently this is not their only food, one of the stomachs also having revealed a pair of beetle elytra.

In Puerto Ayacucho most of the specimens were also found hiding under granitic rocks or in the proximity of them and the same is true for the small specimens collected in Casa de Julián. Here, a small, swift stream runs for about 100 yards over a bed of solid granite. The specimens, together with a few long-tailed tadpoles that very probably belong to this species, were found under a loose stone at the edge of the stream. Very little water reached the stone and the tadpoles seemed to have some difficulty in wriggling about, but stones in deeper water or in muddy places nearby revealed no amphibian life.

The material from Sanariapo comes mostly from the edge of the river (collected at night) with granite rock at not more than a few hundred feet away. A few small and probably recently metamorphosed specimens were seen at a short distance from this place on an extensive "laja" of black bare granite that contained water in many of its holes and depressions. Crustaceans and mosquito larvae were also collected in these pools.

I have the impression that *Leptodactylus rugosus* is very much restricted to black, crystallized rock and that it will not be found outside of the Guayana Highlands.

Additional Localities. Auyantepui (A.M.N.H. 46038-9); Border between British Guiana and Venezuela (U.M.M.Z. 85211); Canal Casiquiare, between Colombia and Venezuelan border (A.M.N.H. 23160-2); Puerto Ayacucho, near Venado (U.S.N.M. 80664-73); Puerto Ayacucho (A.M.N.H. 23209-19); Sanariapo (U.S.N.M. 80035-8); Upper Orinoco (Parker, 1936); 20 mi. west of Wiaka Piapu Mts. (U.M.M.Z. 85158 [2]); Wiaka Piapu Mts. (U.M.M.Z. 85209 [2]).

Range. The Venezuelan Guayana. British Guiana, southwestern Colombia and probably northern Brasil.

Remarks Examination of the paratype (A.M.N.H. 3790), now in M.C.Z., and later of the type, has revealed close morphological agreement with the animals reported here, although probably due to the preservative used by the collector, the color is, as described by Noble, reddish brown. His specimens were 16.5 to 41 mm. in snout-vent length.

In reporting on an Upper Orinoco collection in the Brussels Museum, Parker (1936:2) identified three specimens as *L. rugosus* but pointed out that both males in the collection had single nuptial spines while the female was distinctly larger than Noble's (49 mm.). Noble's specimens did not have nuptial spines.

Leptodactylus rugosus Melin, 1941, is preoccupied by *L. rugosus* Noble. For Melin's form, Lutz and Kloss have created the name *L. melini.* I regard this form as a synonym of *L. marmoratus hylaedactylus* (see page 35).

Lithodytes lineatus (Schneider)

Rana Lineata Schneider, 1799, Hist. Amphib., *1*: 138.

1 (U.P.R. 104) La Culebra, 1000 ft., vi.50.

Description. Physiognomy of *Dendrobates;* snout somewhat truncate; tongue oval, entire and free behind; vomerine odontoids in two short, slightly arched series behind the choanae, their anterior convexities extending to the middle of the inner margin of the latter; interorbital space slightly broader than an upper eyelid; tympanum almost as large as the eye; canthus not distinct, rounded; loreal nearly vertical, not distinctly concave; first finger longer than second; tips of fingers and toes distally swollen; a moderate tarsal and a metatarsal fold; toes free, with an indication of a lateral fringe; heel of the adpressed hind limb extends to the posterior corner of the eye. Skin above and on sides of the head, lower lip and limbs studded with regularly distributed tubercles; on the thighs the tubercles are limited to a central longitudinal band. Ventral surfaces, smooth.

Color. Above, dark grayish-brown with two longitudinal stripes that begin at the tip of the snout and end in the groins; several red spots on the thighs, hidden portions of the tibiae, tarsii and feet. Below, grayish, with round white spots on the belly and throat.

Measurements. ♂ snout-vent 45.5; head breadth 8.5; head length 8.5; femur 13.5; tibia 9.5.

Habits. The only specimen was collected at night at the edge of a savanna, more toward the forest side than to the grassland.

Range. The Venezuelan Guayana. Colombia (Río Garagoa), Trinidad, British Guiana, Ecuador and probably northern Brasil.

Remarks. I have examined very large specimens of this species (50 mm.) and all of them have T-shaped terminal phalanges.

There is practieally no difference between animals from Trinidad, British Guiana, Venezuela and Ecuador.

Key to the Species of Eleutherodactylus *Reported from Venezuela*

I. First finger longer than second.
  A. Head and mouth very large; dorsum tubercular and ridged ..... *cornutus maussi*

II. First finger equal to, or shorter than second.
  A. Tympanum ½ to ⅔ the eye diameter.
    1. First finger shorter than second.
      a. Margins of the frontoparietals elevated; skin above smooth; vomerine teeth oblique ..... *bricconi*
      b. Margins of the frontoparietals not elevated; skin above finely granular; vomerine teeth transverse ..... *turumiquirensis*
    2. First finger equal to second.
      a. Heel of the adpressed hind limb extends to the nostril or beyond ..... *terraebolivaris*
      b. Heel of the adpressed hind limb does not reach the nostril.
        1. Thigh ½ the length between anus and anterior corner of the upper eyelid; eye diameter shorter than distance between eye and nostril; belly granular .... *brachypodius*
        2. Thigh ½ the length between anus and middle or tip of the snout; eye diameter equal to distance between eye and nostril; belly smooth or granular ..... *conspicillatus ileamazonicus*
  B. Tympanum not more than ⅓ the eye diameter.
    1. Tympanum small and indistinct; disks small, narrow, more or less pointed ..... *stenodiscus*
    2. Tympanum distinct, even if small; disks not pointed.
      a. A brown or black lateral band.
        1. Eye diameter greater than distance between eye and nostril ..... *orocostalis*
        2. Eye diameter not greater than distance between eye and nostril ..... *bicumulus*
      b. No lateral band.
        1. A white (red?) area at the groin and another under the arm ..... *williamsi*

2. Not as above.
   a. Eye diameter greater than distance between eye and nostril.
      (1) Anterior and posterodistal portions of thighs stained with orange brown; a W-shaped scapular marking ..... *rozei*
      (2) Not as above ..... *orocostalis*
   b. Eye diameter not greater than distance between eye and nostril.
      (1) Disks not broader than the tympanum; thighs usually tinged with red ..... *urichi*
      (2) Disks broader than the tympanum; thighs not tinged with red.
         a. Heel extending to the nostril or beyond ..... *reticulatus*
         b. Heel not extending to the nostril.
            (i) Thighs with white spots and/or bars; 36 mm.; Coastal Range ..... *racenisi*
            (ii) Thighs without white spots or bars; 15-22 mm.; Venezuelan Guayana.. *marmoratus*

C. Tympanum absent[1] ..... *anotis*

Eleutherodactylus cornutus maussi (Boettger)

Hylodes maussi Boettger, 1893, Ber. Senckenb. Naturf. Ges.: 39: Puerto Cabello, Venezuela; Nieden, 1923, Das Tierreich. Anura I: 466; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 40.

1 (M.C.Z. 10178, juv.) Pto. Cabello, 1895.
1 (U.M.M.Z. 56774, juv.) Sn. Esteban.
1 (U.C.V. 38) Guamitas, iii.51.
7 (U.C.V. 19, 106, 113, 116-8, 1159) Rancho Grande, 49-51.

Description. Head large; snout broad, subovoid, sloping toward the front; vomerine odontoids forming two slightly arched groups behind the choanae, their anterior convexities touching the posterior margin of the latter; tongue rounded, entire and ⅓ free; interorbital space more or less as broad as an upper eyelid; margins of the frontoparietals prominent; eye diameter equal or slightly shorter than distance between eye and nostril; canthus obtusely angular; loreal strongly sloping, concave; tympanum distinct, ⅔ the eye diameter; a row of four or more tubercles along the forearm; metacarpal tubercles large, subarticulars very large, rounded and prominent, especially on the first finger; fingers free but with thick lateral fringes, including

[1] Present, but small and indistinct in young specimens, which can be distinguished by having red on the venter and/or limbs.

the outside of the first; first finger longer than second, which is more or less equal to fourth; digits distally dilated; a tarsal fold; an indistinct, outer and a small, elongated, inner metatarsal tubercle; subarticular tubercles of toes large, conical and very prominent; disks of toes small but distinct; heel of the adpressed hind limb extends to between eye and nostril. Skin above and on the sides of the head and flanks tubercular; upper eyelid tubercular, one of the posterior tubercles being longer than the others; a pair of longitudinal, curved ridges from behind the upper eyelid to the post-scapular region; usually a cross ridge or row of tubercles unite the two longitudinal ridges in the middle, forming with them a)—(figure; behind this figure, two other ridges, usually less prominent and closer together occur; another very short, oblique ridge or series of tubercles at the angle of the mouth; on the limbs some rows of tubercles fuse to form oblique ridges. Throat, belly and thighs thickly granular.

Color. Dark gray (pinkish in life), the ridges and some of the tubercles being sometimes of a darker color; a light line from lower eyelid to near the angle of the mouth is generally followed anteriorly by a triangular darker spot, another light line and another dark spot; limbs sometimes crossbarred; posterior part of the thighs of the same color as the body. Below, dark brownish gray, the granules being lighter than the ground color; throat and limbs usually darker than the belly.

Measurements. ♀ snout-vent 59.5; head breadth 24; head length 19; femur 26; tibia 26.5.

Habits. In Venezuela this appears to be mainly a subtropical forest form.

Additional Localities. Puerto Cabello (Nieden, 1923; Lutz, 1927 [cited from Boettger, 1893]).

Range. The Coastal Range and probably the Andes. The species extends from Colombia to Ecuador.

Remarks. U.C.V. 38 has a much lighter color than the Rancho Grande specimens, the limbs are lighter than the body color, and the venter is plain white.

Topotypical specimens of *E. cornutus cornutus* (M.C.Z. 19640-2; Canelos, Ecuador) have a more depressed snout than *maussi;* the dorsum occasionally has extensive dark spots (M.C.Z. 19642), the posterior part of the thighs is black with light pinkish (red?) spots, and the groins, anteroventral and ventrodistal portions of the thighs are equally spotted or more broadly marbled; there are large pinkish spots on the hidden portions of the tibia and

tarsus and in specimen 19642, one of the lines that radiates from eye to lip is broad and very distinct.

It is very possible that *Hylodes sulcatus* Cope, 1874, from Nauta, Perú and *Ctenocranius koki* Melin, 1941, from Taracúa, Brasil, are conspecific with *Eleutherodactylus cornutus* (Espada), 1870, from San José de Moti, Ecuador. The first, however, is described as having an areolate belly.

If the large-headed *Eleutherodactylus* of the *cornutus-biporcatus* group is found to constitute a genus, the name *Strabomantis* Peters, 1863, will probably be the available name while *Limnophys* Espada, 1870, and *Ctenocranius* Melin, 1941, will become synonyms. So far, I do not think that the characters mentioned by Melin are sufficient to separate the two groups.

Eleutherodactylus briceni (Boulenger)

Hylodes briceni Boulenger, 1903, Ann. Mag. Nat. Hist., (7) *11*: 481: Mérida, Venezuela; Nieden, 1923, Das Tierreich. Anura I: 466; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 39.

2 (M.C.Z. 3888, 7601, cotypes) Mérida.

Description. Snout subovoid; tongue broadly oval, entire or indistinctly nicked and free behind; vomerine odontoids forming two short, oblique and close together series behind the choanae, converging posteriorly and not extending outwards beyond the vertical of the inner margin of the latter; interorbital space slightly concave, broader than the upper eyelid; margin of the frontoparietals slightly elevated; eye diameter equal to distance between eye and nostril; canthus distinct, somewhat curved; loreal sloping, concave; tympanum small, not very distinct, about ½ the eye diameter; a pair of indistinct metacarpal tubercles; subarticular tubercles moderate, round; first finger shorter than second; disks small, truncate, equal or slightly smaller than the tympanum; disks of the toes smaller than those of the fingers; an indistinct outer, and an oval, inner metatarsal tubercle; toes free; heel of the adpressed hind limb extends to the anterior corner of the eye. Skin above, smooth. Below, smooth in the throat, breast and central part of the belly; sides of the belly sometimes with flat, irregular sized granules.

Color. Above, brown with darker, sometimes chevron-shaped markings; an interorbital band; dark, narrow canthal and supratympanic streaks; flanks brown with darker reticulations or light centered, dark brown spots; limbs diffusely crossbarred. Below whitish, reticulated or marbled with brown.

Measurements. Snout-vent ♂ ? 28, ♀ 36; head breadth ♂ ? 10, ♀ 16; head length ♂ ? 9, ♀ 12.5; femur ♂ ? 11.5, ♀ 16; tibia ♂ ? 13, ♀ 17.5.

Additional Localities. Mérida (U.M.M.Z. 46461, 51262, cotypes; Nieden, 1923); nr. Mérida (A.M.N.H. 10507).

Range. The subtropical zone of the Mérida Andes.

Remarks. The species has, even when preserved, a very unique look about the eyes that makes it easily distinguished anywhere.

The two folds that were described on the anterior part of the back were only detected in U.M.M.Z. 51262, probably a male.

Eleutherodactylus turumiquirensis sp. n.

Type. American Museum of Natural History No. 22557, a ♀ from La Trinidad, Mt. Turumiquire, in cave at 5,500 ft. Coll., Tate and Clements.

Diagnosis. A large *Eleutherodactylus* with broad head, transverse vomerine teeth, curved canthus rostralis, tympanum ½ the eye diameter, no outer metatarsal tubercle, heel extending to between eye and nostril, and light colored (red?) spots on the anterior part of the thighs.

Description. Head as broad as long; snout broad, subovoid; tongue wide, emarginate and free behind; vomerine odontoids small, in two transverse groups behind the small, round choanae; eye diameter shorter than distance between eye and nostril; interorbital space about 1½ times broader than an upper eyelid; canthus curved, well defined; loreal strongly sloping, concave; tympanum small, ½ the eye diameter; two moderate metacarpal tubercles; subarticular tubercles moderate; disks large, about ¾ the size of the tympanum; first finger reaching the base of the disk of the second; femur half the length of the body; no outer metatarsal tubercle; toes free, their disks smaller than those of the fingers; heel of the adpressed hind limb extends to between eye and nostril. Skin above, finely granular, the granules being smaller in the head region. Below, smooth on the throat, chest and antero-central portion of the belly; rest of the belly and posterior part of the thighs granular.

Color. Above, mostly plain brown with an obscure interorbital bar and two other diffuse dark spots on the scapular region; upper lip with dark, vertical bars; thighs, hidden portions of the tibiae and posterior parts of the flanks with several large, yellowish (red?) spots. Below, white, marbled on the throat and more loosely marbled (some brown reticulations) on the belly.

Measurements. ♀ snout-vent 40; head breadth 14; head length 14; femur 20; tibia 21.5.

Remarks. The paratypes are both females with the same data as the type and agreeing in most characters:

A.M.N.H. 22558, snout-vent 46; head breadth 17; head length 16.5; femur 21.5; tibia 24. The spots on the limbs and flanks are larger and much better defined; there is a very small and indistinct outer metatarsal tubercle.

A.M.N.H. 22559, snout-vent 39.5; head breadth 14; head length 14; femur 20; tibia 23. This specimen is rather desiccated; there are no distinct light spots on the thighs and tibiae, but, on the other hand, there are some dark, lightly margined ones. The heel reaches the tip of the snout.

The species is quite distinct from everything known from Venezuela.

Eleutherodactylus terraebolivaris sp. n.

Hylodes gollmeri Peters, 1863, Monats. Akad. Wissensch. Berlin: 409; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 40.

Hylodes gollmeri Nieden, 1923, Das Tierreich. Anura I: 464 (part).

Type. Museum of Comparative Zoology, no. 31062, a ♀ from Rancho Grande, Edo. Aragua. Coll. J. A. Rivero, 20 Dec. 1958.

Diagnosis. An *Eleutherodactylus* of moderate size, with long snout; sharp canthus rostralis; eye diameter shorter than distance between eye and nostril; broad disks; heel of the anteriorly adpressed hind limb extending to the tip of the snout or beyond; granular venter; no femoral spots; two small, black spots on the scapular region, and usually, two other black spots on the snout, in front of the eyes.

Description. Head longer than broad; snout long, subelliptical; tongue oval, emarginate or free behind; vomerine odontoids in two oblique series behind and between the choanae, their posterior extremities directed inwards; eye diameter shorter than distance between eye and nostril; interorbital space as broad as an upper eyelid; canthus angular; loreal almost vertical, scarcely concave; tympanum distinct, ⅔ the eye diameter; a supratympanic fold from posterior corner of the eye to shoulder; an indented outer, and an oval, prominent, inner metacarpal tubercle; subarticular tubercles conical, distinct; first finger equal to second; disks truncate, about ⅓ the size of the tympanum; an indistinct, short tarsal fold originating below the middle of the tarsus and extending to the inner metatarsal tubercle; toes free; heel of the

adpressed hind limb extending to beyond the tip of the snout. Skin above and on the flanks finely shagreened. Throat and anterior part of the belly, smooth; posterior part of the belly with small granules.

Color. Above, brown, with irregular, obscure spots; some of these chevron shaped; two small, elongated spots on the snout; two rounded, small scapular spots and two smaller ones in back of these; loreal region, especially the upper part, darker than the rest of the head; tympanum traversed above by a black supratympanic streak; limbs crossed by dark, light margined bars. Ventral surfaces white, uniform except on the limbs, where some infuscation occurs.

Measurements. ♀ Snout-vent 31; head breadth 10.9; head length 12.7; femur 11.3; tibia 18.7.

Habits. The species is quite abundant in the subtropical forests of the Coastal Range, occurring on the margins of streams together with *Atelopus c. cruciger* and *Prostherapis t. trinitatis.*

Additional Localities. Avila, Cerro (U.C.V. 120-3, U.P.R. 653); Bejuma (U.M.M.Z. 55545); Rancho Grande (U.C.V. 18, 72, 105).

Range. The Coastal Range of Venezuela. (See below.)

Remarks. The following specimens are designated as paratypes: U.S.N.M. 117527-36, 128807-34, Los Canales; U.S.N.M. 128835, Quebrada Chacaíto; U.S.N.M. 128836, Camino de Galipán. Río Cotiza; U.S.N.M. 128884, Curupao; U.M.M.Z. 55545, Bejuma; U.C.V. 120-3, Cerro Avila; U.C.V. 18, 72, 105, Rancho Grande; U.P.R. 653, Pie del Avila. In general physiognomy all paratypes agree with the type, but the following variations may occur:

1. The vomerine teeth may be very strong and joining in the middle.
2. The heel of the adpresesd hind limb may only extend to the tip of the snout.
3. The dorsal surfaces are occasionally granular and/or with scattered tubercles.
4. Two small tubercles are generally present on the snout, in the middle of the two black spots.
5. Two scapular spots are present in greater or lesser degree of distinctness in all individuals.
6. The type is an exception in having an almost smooth belly; in all paratypes the posterior part of the belly is distinctly granular, the granules being larger than the dorsal granules.

7. A narrow vertebral line and sometimes two broad paravertebral bands may be present in some individuals.
8. Adult size seems to be variable. Specimens of 50 mm. have been measured.
9. Some of the specimens from Cerro Avila at U.C.V. were greenish gray when fresh.

Examination of a specimen labeled as "Typus" of *Eleutherodactylus gollmeri* (Berlin, Mus. 3168, Caracas) reveals this animal to represent the Central American form currently known as *Eleutherodactylus lanciformis,* an animal well characterized by its narrow disks and smooth belly. As Peters' description of *E. gollmeri* also corresponds to the Central American form, it appears that the type was somehow mislabeled or that a collection of Central American frogs got mixed with one from Venezuela, with the result that the name *E. gollmeri* has persistently, though incorrectly, been applied to the Venezuelan species. The name *Eleutherodactylus terraebolivaris* is here suggested for the Caracas and Coastal Range form previously known as *E. gollmeri.*

Under the name of *E. gollmeri,* a frog has been reported from Ecuador (Parker, 1936; Andersson, 1945; Boulenger, 1882; Peracca, 1904), Bolivia (Andersson, 1906), Matto Grosso (Boulenger, 1903), and Orgel Gebirge, Brasil (Bauman, 1912). The record from Orgel Gebirge probably refers to *E. güntheri* while that from Matto Grosso may represent the *E. conspicillatus ileamazonicus* here described. It seems to me that two specimens from Bolivia at M.C.Z. (10094-5) represent *E. longirostris* and that may also be the case with other records from Bolivia and Ecuador. Andersson (1945:28) seems to include a composite of *E. c. conspicillatus* and perhaps *E. longirostris,* under his *E. gollmeri.*

Some specimens of *E. terraebolivaris* may be almost impossible to separate morphologically from *E. c. conspicillatus,* especially if in the latter, thigh spots are indistinct and webs are lacking (as they sometimes are). *E. terraebolivaris* is always granular on the belly, even although in most cases, the granules may be restricted to the posterior half. *E. c. conspicillatus* is usually smooth below, and when granular, the granules are usually finer than the dorsal granules. One can say that if it is absolutely smooth it is not *E. terraebolivaris,* but the opposite cannot be said of *E. c. conspicillatus.*

E. conspicillatus ileamazonicus is also similar to *E. terraebolivaris,* but it is apparently separated from the range of that species (here presumed to be limited to the subtropical regions of

the Coastal Range of Venezuela) by the whole Llanos. Neither of the two forms has been recorded from the Guianas nor the Delta Region, and *terraebolivaris* is not known from the easternmost section of the Coastal Range. So far as known, the two forms are thus completely discontinuous in their ranges. On the other hand, *E. c. conspicillatus* has been collected by Stebbins at Meta, Colombia (*vide*), and if Boulenger's "*E. gollmeri*" from Matto Grosso represents *E. conspicillatus ileamazonicus,* it would follow that the race would occupy most of the Amazonian region, west to the Andes, where the typical form occurs.

The proposed relationship of *E. c. conspicillatus* and *E. c. ileamazonicus* is admittedly based on little evidence, but the morphological similarity of frogs belonging to this general group of *Eleutherodactylus* is so great, and the relationships between each other are so obscure at present that it has not been considered desirable to propose a new species name for the Amazonian form.

Related to *E. terraebolivaris* are *E. longirostris,* from Bolivia and Ecuador, and Central American *E. gollmeri* and *E. fitzingeri,* this last a species which may be found to be conspecific with *E. c. conspicillatus. Conspicillatus, gollmeri* and *longirostris* may sometimes have the scapular and snout spots that are found in *E. terraebolivaris.*

Alemán's, 1952, *Eleutherodactylus* cf. *gollmeri* from Turgua most probably refers to this species.

Eleutherodactylus brachypodius sp. n.

Type. Museum of Comparative Zoology No. 28568, a ♀ from the Upper Cunucununa region, Territorio Amazonas. Coll. J. A. Rivero, May to June, 1950.

Diagnosis. A large *Eleutherodactylus* with long snout, tympanum ⅔ the eye diameter; first finger as long as the second and very short hind limbs, the heel of which does not reach the nostril.

Description. Head longer than broad; snout long, subelliptical but with a rather blunt tip; tongue broad, granular, emarginate and free behind; vomerine odontoids in two short, oblique groups behind and between the choanae, their posterior extremities convergent; eye diameter slightly shorter than distance between eye and nostril; interorbital space a little narrower than an upper eyelid; canthus well defined; loreal scarcely oblique, slightly concave; tympanum ⅔ the eye diameter; a supratympanic fold

from posterior corner of the eye to shoulder; a terminally divided palmar and an oval, more prominent, inner metacarpal tubercle; subarticular tubercles moderate; first finger as long as second; disks truncate, about ⅓ the diameter of the tympanum; apparently an indication of a tarsal fold on the distal half of the tarsus; metatarsal tubercles moderate; toes free, disks of the toes smaller than those of the fingers; thigh half the length between anus and anterior margin of upper eyelid; heel of the adpressed hind limb extends to the posterior corner of the eye. Skin above, shagreened; flanks granular. Below, smooth on the throat, breast, and central part of the belly; sides of the belly and hind part of the thighs granular.

Color. Above, very dark slate gray, almost black; snout rather browner; a black canthal and fine supratympanic streak; tympanum chestnut; lower part of the loreal region and lower part of the flanks grayish white; limbs grayish with darker diffuse spots. Below, dirty white.

Measurements. ♀ snout-vent 38.5; head breadth 14; head length 15; femur 16; tibia 18.

Remarks. U.P.R. 213, a ♀ from the forest floor of Mt. Marahuaca, 5,000 ft. and U.P.R. 210, a ♀ from a "conuco" or Indian plantation at La Culebra, 1000 ft. are very similar in structure to *E. brachypodius* but have not been designated as paratypes on account of some differences that may or may not be of significance. In both, the hind limbs look longer, the heel reaches between eye and nostril, the color above is much lighter (yellowish gray) and with irregular darker markings, there is no distinct separation between dorsal and ventral color, and the canthus in no. 213 is more vertical. Both specimens contain eggs and they agree in structural characters.

Eleutherodactylus brachypodius differs from *E. gollmeri* in its less tapering snout, finely granular posterior part of the belly, absence of scapular spots and much shorter hind limbs; from the Venezuelan *E. conspicillatus* in its less tapering snout, light loreal region, absence of chevron markings on the dorsum and much shorter hind limbs.

Unfortunately, the exact locality where the type of *E. brachypodius* was collected was not recorded. From my field notes I deduct that it is either Casa de Julián or Marahuaca, 4,050 ft.

ELEUTHERODACTYLUS CONSPICILLATUS ILEAMAZONICUS ssp. n.

Figure 2

Hylodes frenatus Boettger, 1896, Ber. Senckenb. Naturf. Ges., LIV (nom. nud.).

Type. Museum of Comparative Zoology No. 30397 a ♂ from Temiche, Mt. Marahuaca, 4050 ft., S. Venezuela. Coll. J. A. Rivero, May 1950.

Fig. 2. *Eleutherodactylus conspicillatus ileamazonicus* ssp. n. Type M.C.Z. 30397.

Diagnosis. A medium-sized *Eleutherodactylus* differing from the typical form in its smaller size, shorter legs and in lacking toe webs and white spotting or marbling on the posterior part of the thighs.

Description. Head longer than broad, snout subelliptical; tongue oval, free and nicked behind; vomerine odontoids in two strongly oblique and separated groups behind and between the small, round choanae, their posterior extremities convergent; eye diameter equal to distance between eye and nostril; interorbital space more or less as broad as an upper eyelid; canthus well defined; loreal almost vertical, slightly concave; tympanum distinct, ⅔ the eye diameter; a supratympanic fold from posterior corner of the eye to shoulder; a divided outer and an oval,

inner metacarpal tubercle; subarticular tubercles distinct, rounded; fingers free, the first more or less equal to second; largest disk about ⅓ the size of the tympanum; a round outer and an oval inner metacarpal tubercle; toes free; heel of the adpressed hind limb extends to between eye and nostril. Skin above, finely granular, with larger granules or tubercles scattered among the finer ones especially behind the eyelids and toward the flanks. Below, granular on the sides of the throat, belly and hinder aspect of thighs. A ventral discoidal fold and a moderate, subgular vocal sac.

Color. Above, brown with irregular, confluent markings on the back; one of the dorsal markings forms a chevron in the middle of the dorsum; another, forming an interorbital spot, sends two extensions backward to the sides of the chevron; two dark dots on the snout, in front of the eyes, and in the center of each of these a small tubercle; a dark supratympanic and a canthal streak; loreal region lighter than the body color and with a few short dark bars on the lip; a few dark spots on the anterior distal border of the thighs; limbs crossbarred; posterior part of the femur uniform brown, of the tarsus and sole dark brown. Below, brownish white.

Measurements. ♂ snout-vent 31.6; head length 12.8; head breadth 11; femur 16; tibia 17.6.

Habits. All specimens were collected on the forest floor or on the stems of plants at not more than a foot from the ground. These frogs were heard at dusk and dawn but not during the intervening hours of the night. The species apparently prefers "eonneos" and cleared areas where the conditions are not very humid or the vegetation dense. The voice is something like a "toot, toot, toot."

Range. The Venezuelan Guayana. The species extends from the Colombian Andes to Perú. It has been reported from east and west of the Andes and also from Matto Grosso (Cope, 1887a). A number of records of *E. gollmeri* from Ecuador (Boulenger, 1882; Peracca, 1904; Parker, 1936; Andersson, 1945) may refer to this species or to *E. longirostris.*

Remarks. The following specimens are designated as paratypes:

U.P.R. 105, a ♀ from Alto Cunucumma. Coll. J. A. Rivero, April 1950. Snout-vent 39; head length 15.6; head breadth 14.1; femur 19; tibia 22.

U.P.R. 107, a ♂ from Mt. Marahuaca, 4050 ft. Coll. J. A. Rivero, May 1950. Snout-vent 29.7; head length 11.7; head breadth 11; femur 15.7; tibia 17.

U.P.R. 38, an immature specimen from Mt. Marahuaca, 4050 ft. Coll. J. A. Rivero, May 1950. Snout-vent 18.3.

U.P.R. 108, a ♂ from Tapara, Alto Cunucunuma. Coll. J. A. Rivero, April 1950. Snout-vent 24; head length 10.4; head breadth 9.5; femur 13; tibia 14.4.

U.P.R. 212, a ♂ from Tapara, Alto Cunucunuma. Coll. J. A. Rivero, April 1950. Snout-vent 26.7; head length 11; head breadth 9.5; femur 12.5; tibia 15.5.

Paratypes agree morphologically with the type except for the fact that the tympanum can only be ½ the eye diameter and the heel of the adpressed hind limb may reach only to the anterior corner of the eye. All specimens from Mt. Marahuaca or the Cunucunuma River have irregular or chevron-shaped markings on the dorsum, but in the specimen 211 from Mt. Duida, they are not apparent. The basic body color may be of a variable shade of brown and the loreal region may be lighter or darker than the body color. The two snout dots are present in all specimens from Mt. Marahuaca, although not too well defined in some. There is no marbling or spotting on the hind part of the thighs of any of the examples.

Other material examined includes specimens from the foothills of Mt. Duida, 750-800 ft. (A.M.N.H. 23205, 23176); Caño Pescado, 325 ft. (A.M.N.H. 23183-4); Cerro Yapacana (U.S.N.M. 83950); Iguapo, S. Venezuela (Senckenb. Mus. 51844-5) and Mt. Duida, 2000-4000 ft., (U.P.R. 211). The latter is more or less of a solid color (some darker scribblings may be detected) and does not show the two snout dots of the type and paratypes.

The Venezuelan form differs from Ecuadorian material in its smaller size (males especially are smaller), total absence of web in the toes, lack of any marbling or spotting on the posterior aspect of the thighs, and shorter hind limbs. Out of 43 specimens of Ecuadorian and Peruvian *E. conspicillatus* examined, only 4 did not have any web (the largest four — one of them 65.1 mm. in snout-vent length) while all of them had some marbling or spotting (even if not too clear in a few) on the posterior aspect of the thighs.

Morphologically, this species is almost identical with *E. terraebolivaris* but the Venezuelan race can be distinguished by its darker color, smooth or finely granular belly and shorter hind

limbs. The length of the femur from the anus is included twice in the distance between anus and tip of the snout in *conspicillatus ileamazonicus* but in *gollmeri* the double measurement usually extends beyond the tip of the snout. In *E. c. ileamazonicus* the extended heel does not pass beyond the nostril while in *E. terraebolivaris* it usually extends considerably beyond the tip of the snout. A good distinguishing character is the appearance of the belly. In *E. c. ileamazonicus* the belly is smooth on the center or finely granular (the granules not larger than the dorsal granules) while in *E. terreabolivaris* the ventral granules are large and distinct.

A 31 mm. ♀ specimen of *E. conspicillatus,* from nr. Sn. Martín, Meta, Colombia (Berkley) has the thigh marbling of the topotypical form. The species has also been reported from Matto Grosso (Cope, 1887a), but these examples are said to have lacked the thigh marblings of the Andean animal.

The type and one paratype (U.P.R. 105) are very similar in dorsal pattern and body form to Boulenger's (1882, pl. xiv) figure of *E. conspicillatus.*

Hylodes peruvianus Melin, 1941, is probably a synonym of *E. c. conspicillatus.*

Eleutherodactylus stenodiscus Walker and Test

Figure 3

Eleutherodactylus stenodiscus Walker and Test, 1955, Occ. Pap. Mus. Zool. Univ. Mich. No. 561: 2. Pico Periquito, Rancho Grande.

2 (U.M.M.Z. 109870, paratypes) Pico Periquito, Rancho Grande, 1375 m.

Description. Head slightly longer than broad; snout long, subovoid; tongue rounded, ⅓ free, slightly nicked behind; vomerine odontoids small, oblique, converging posteriorly, between and immediately behind the round choanae, their anterior extremities at level with the posterior margin of the latter; eye large, its diameter as long as the snout; interorbital space slightly broader than an upper eyelid; canthus well defined but rounded; loreal moderately sloping, concave; tympanum very small and indistinct, less than ⅓ the eye diameter; two tubercles at the angle of the jaw; two or three small, indistinct tubercles on the arm close to the wrist; first finger shorter than second, which is more or less as long as fourth; an elongated inner and a divided outer

metacarpal tubercle; disks subtriangular, pointed, that of the first finger much smaller than others; a few tubercles at the heel, one or two of which are very prominent and distinct; a slight tarsal fold; metatarsal tubercles small; subarticulars small,

Fig. 3. *Eleutherodactylus stenodiscus* Walker and Test. Paratype U.M.M.Z. 109870.

not prominent; toes free, their disks pointed, as large as those of the fingers; heel of the adpressed hind limb extends to between eye and nostril. Skin above shagreened or granular, with scattered, small tubercles; upper eyelids with several small tubercles and a distinct prominent one near the top. Below, granular on the belly and posteroventral aspect of the thighs; throat smooth.

Color. Above, grayish brown, with diffuse darker blotches; eyelids dark brown; a light interorbital line diffuses anteriorly and blends with the brown color of the snout; a dark brown canthal spot and a supratympanic streak; two brown bars radiating from eye to upper lip; between these, and anterior to the foremost, two other smaller dark spots; white labial dots occur between the brown bars and spots; two distinct, rounded brown spots above the groins; seat with a brown triangular spot that

extends distally halfway on the posterior part of the thighs; thighs with or without crossbars above; humerus, tibia and tarsus with dusky crossbars or diffuse blotches. Ventral surfaces light brownish, with greater infuscation on the throat and limbs; lower lip margined with white dots; tarsus and foot dark brown.

Measurements. Snout-vent 18.5; head length 6.9; head breadth 6.8; femur 8.5; tibia 9.5.

Habits. Collected in the forest floor at 1375 m., "where there were considerable accumulations of leaf litter" (Walker and Test, *op. cit.*).

Range. Known only from the type locality.

Remarks. The main variation is said to be in dorsal pattern. The lumbar spots were absent in 5 of the 24 individuals available to Walker and Test, but even those 5 had a dorsolateral stripe terminating above the groin. In paratype 109870 (field no. AB 4392), there are 2 small spots in front of the lumbar ones. A dusky diagonal bar from shoulder to sides is present in this specimen, and according to the description, in the type and all paratypes. In 109870 (field no. AB 4380) it is, however, limited to a small diffuse spot above the shoulder. Chevron-shaped markings or longitudinal stripes are described for some of the specimens.

E. stenodiscus is similar to the Jamaican *E. andrewsi* and to a lesser extent, to *E. emiliae* from Cuba. Both of these species have pointed disks, two lumbar spots and a black seat, but the tympanum is larger and more distinct in the two Antillean forms, and in *E. emiliae* the eyes are small and the head much broader at the base.

Among the Venezuelan *Eleutherodactylus, stenodiscus* can be easily distinguished by its characteristic coloration, indistinct, almost hidden tympanum, and pointed disks.

Eleutherodactylus orocostalis sp. n.

Figure 4

Type. Universidad Central de Venezuela No. 2003, a ♀ from El Junquito, D.F. Coll. Roze, 12 April 1951.

Diagnosis. A small *Eleutherodactylus* with subtriangular snout; head slightly broader than long; eye diameter greater than distance between eye and nostril; heel extending to the eye; dorsum tubercular, with a large tubercle on the upper eyelid and another at the heel; color variable, usually black or very dark brown above; marbled or reticulated below.

Description. Head slightly broader than long; snout subtriangular; tongue oval, free and nicked behind; vomerine odontoids in two small, rounded groups behind and between the choanae, their exterior extremities not extending to the vertical of the inner margin of the latter; eyes protuberant, their diameter

Fig. 4. *Eleutherodactylus orocostalis* sp. n. Type U.C.V. 2003.

longer than distance between eye and nostril but slightly shorter than the snout; interorbital space as broad as an upper eyelid; canthus well defined; loreal little inclined, concave; tympanum distinct, ⅓ the eye diameter; two small tubercles between tympanum and arm; others between elbow and wrist; metacarpal tubercles small; first finger shorter than second; first disk small and narrow, only slightly broader than phalanges; others relatively large, almost as large as the tympanum; a large tubercle at the heel and other smaller ones at the tarsus; a rounded outer and an elongated inner metatarsal tubercle; subarticular tubercles moderate; heel of the adpressed hind limb extends to the middle of the eye. Skin above, tubercular; upper eyelid with a large tubercle and other smaller and less distinct ones; upper flanks tubercular. Belly granular.

Color. Above, very dark brown, almost black; limbs with narrow oblique listing over a lighter background. Below, dusted and marbled with brown.

Measurements. ♀ snout-vent 20.5; head breadth 8.2; head length 8; femur 10.1; tibia 10.2.

Habits. During the daytime, *E. orocostalis* is usually found under the leaf litter in heavily wooded areas.

Remarks. Paratypes (U.C.V. 2001-7, El Junquito) agree in morphological characters with the type except for the fact that the heel may extend to the anterior corner of the eye or slightly beyond, and the dorsal skin may be less or more tubercular than in the type specimen. In size, none of the examples available surpasses the type.

Coloration is quite variable, the following patterns being the most common:

a. Yellowish brown, tan or chestnut with a dark brown spot on the middle of the body between occiput and sacrum and two broad, dark brown, lateral bands that cover the loreal region and extend posteriorly to the groins.

b. Very dark brown with darker, almost black markings.

c. Variegated with greenish gray and dark gray.

The loreal region may be of a solid color or with distinct crossbars that radiate from eye to upper lip; flanks solid brown or with spots or oblique light and dark bands; limbs distinctly crossbarred, the bars on the thighs being sometimes separated by white spaces; posterior part of the thighs solid brown or with obscure, small, lighter spots. All specimens have a large tubercle on the upper eyelid, another at the heel, two or three at the arm and two or three at the tarsus. The heel tubercle is mammillary and very distinct in some specimens. In most, a W is formed by four or five tubercles on the scapular region.

E. orocostalis is similar to *E. rozei* (see "Remarks" under that species) and, to some extent, to the young of *E. bicumulus*. In this latter species the snout is longer, the orbital diameter not being greater than the distance between eye and nostril, the dorsum is not tubercular, and the heel extends anteriorly to between eye and nostril.

Eleutherodactylus bicumulus (Peters)

Hylodes bicumulus Peters, 1863, Monatsb. Akad. Wissensch. Berlin: 410: Caracas; Boulenger, 1882, Cat. Batr. Sal. Brit. Mus. ed. 2: 215; Nieden, 1923, Das Tierreich. Anura I: 465; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 39.

2 (Berlin Mus. 4899, cotypes) Caracas

Description. Snout subovoid; tip of snout rounded; tongue large, slightly nicked behind; vomerine odontoids in two small, rounded and close together groups between and behind the choanae; eye diameter as long as distance between eye and nostril; interorbital space as broad as an upper eyelid; canthus distinct; loreal somewhat sloping, concave; tympanum small, ½ the eye diameter, with a distinct supratympanic fold; first finger shorter than second; disks well developed; a small tubercle at the heel; outer metatarsal tubercle indistinct, inner more prominent, elongated; heel of the adpressed hind limb extends to the middle of the eye. Above, smooth; flanks and posterior part of the eyelids with small, scattered granules. Below, smooth on the anterior part of the chest and throat; belly and thighs granular.

Color. Above, tan; a black canthal streak continues posteriorly over the tympanum and forms a broad lateral band that extends to the groins; limbs crossbarred; posterior aspect of the thighs dark brown. Chest and belly white, immaculate or slightly reticulated.

Measurements. Snout-vent 34.9; head length 11.9; head breadth 12.5; femur 16.5; tibia 18.9.

Remarks. The name *E. bicumulus* has been applied to a number of forms but cotypes reveal a well characterized animal not too easily confused with any of the other Coastal Range forms. In general physiognomy, *E. bicumulus* looks somewhat like *E. urichi* but it is apparently a larger species and has the lateral band that immediately separates it from *urichi.* Some specimens of *E. güntheri* and *E. orocostalis* also show lateral bands. The first is a southern species with small disks not much broader than the phalanges, while *E. orocostalis* is a very small form with short snout and usually tubercular dorsum.

Through the courtesy of Dr. Charles Walker and Dr. Frederick Test, I have been able to examine three specimens of *E. bicumulus* collected by the latter in Venezuela. As these may be used for a separate report by Dr. Test they are not included here, but it may be well to point out that they agree in most essentials with the cotypes, the lateral band occurring in all specimens in greater or lesser degree of intensity. In the younger examples, the snout seems to be longer and the loreal region more vertical, resembling the condition in *E. terraebolivaris.* They can be distinguished, however, by the shorter hind limbs, presence of the lateral band and absence of scapular spots.

Eleutherodactylus williamsi sp. n.

Figure 5

Type. Universidad Central de Venezuela No. 2012, a ♀ from El Junquito, D. F. Coll. Roze, 16 October 1949.

Diagnosis. A small *Eleutherodactylus* with short, transverse vomerine teeth slightly behind the choanae; tympanum ⅓ the eye diameter; a row of tubercles between elbow and wrist; first finger shorter than second; heel of the adpressed hind limb extending to nostril; tubercular dorsum, granular belly and a white (pink or red?) spot in the axilla.

Description. Snout subovoid; tongue oval, free and slightly nicked behind; vomerine odontoids in two short, transverse groups slightly behind the choanae; eye diameter little shorter

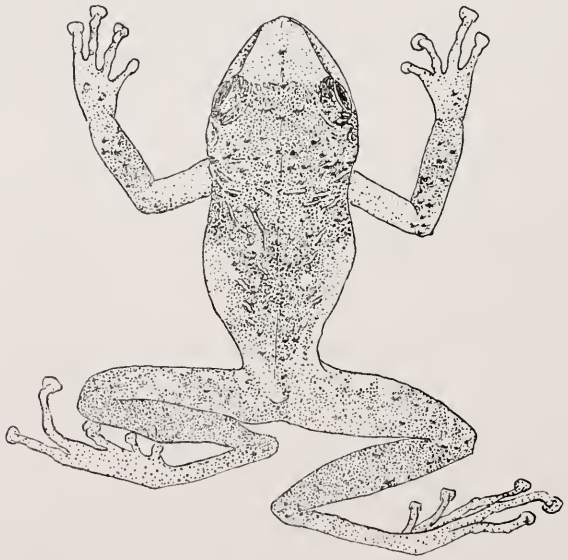

Fig. 5. *Eleutherodactylus williamsi* sp. n. Type U.C.V. 2012.

than distance between eye and nostril; interorbital space about 1½ times broader than an upper eyelid; canthus distinct, curved; loreal slightly oblique, concave; tympanum small, ⅓ the eye diameter; a slight supratympanic fold; two small tubercles between tympanum and arm; a row of small tubercles between elbow and wrist; metacarpal tubercles indistinct; subarticular

tubercles rounded, not very prominent; first finger shorter than second; disks fan-shaped, the largest more or less as large as the tympanum; a small tubercle at the heel; metatarsal tubercles very small; heel of the adpressed hind limb extends to nostril. Skin above, mostly smooth on the head, densely tubercular on the body and sparsely tubercular on the limbs; some tubercles fuse and form long ridges on the sides of the dorsum; a row of three small tubercles on the head between occiput and tip of the snout; upper eyelid slightly tubercular; flanks tubercular above, granular below. Belly granular.

Color. Snout dark chestnut; body behind a narrow, light, interorbital line very dark brown; a white (pink or red?) spot in the axilla and in the inner angle of the elbow; rest of the humeral segment light brown; a broad, dark band around the radio-ulnar segment; an extensive, but not well delimited, white, inguinal spot; anterior part of the thighs with a few light spots, posterior part brown with obscure light spots above and a few dark indistinct ones below; rest of the hind limbs uniform dark brown. Below, dusted or speckled with brown.

Measurements. ♀ Snout-vent 23; head breadth 9.5; head length 9; femur 12; tibia 13.

Remarks. Eleutherodactylus williamsi is quite distinct from everything known from Venezuela and can be distinguished from other species by its tubercular dorsal surface and very typical coloration.

Eleutherodactylus rozei sp. n.

Figure 6

Type. Universidad Central de Venezuela No. 2018, a ♂ ? from Curucuruma, Edo. Aragua. Coll. Roze, 22 March 1951.

Diagnosis. A small *Eleutherodactylus* with rounded, transverse vomerine teeth slightly behind the choanae; eye diameter greater than distance between eye and nostril; tympanum ⅓ the eye diameter; a row of three indistinct tubercles between elbow and wrist; first finger shorter than second; granular belly; distinctly crossbarred limbs and brownish orange regions on the anterior and posterior aspect of the thighs.

Description. Snout short, subovoid; tongue oval, free and slightly emarginate behind; vomerine odontoids in two round, transverse groups behind the choanae; eyes large, their diameter slightly greater than distance between eye and nostril; interorbital space as broad as an upper eyelid; canthus very distinct,

curved; loreal scarcely oblique, slightly concave; tympanum small, ⅓ the eye diameter; a slight supratympanic fold from posterior corner of the eye to shoulder; two small tubercles between tympanum and arm; a row of three small tubercles between elbow and wrist; metacarpal tubercles very small and indistinct;

Fig. 6. *Eleutherodactylus rozei* sp. n. Type U.C.V. 2018.

subarticular tubercles small and indistinct; first finger shorter than second; disks large, fan-shaped, the largest more or less equal to the tympanum; a small tubercle at the heel; metatarsal tubercles minute; heel of the adpressed hind limb extends to between eye and nostril. Skin above, with scattered small tubercles; a small, flat tubercle on each upper eyelid; flanks tubercular. Belly finely granular.

Color. Above, gray with an indistinct bar between the eyes and a large W-shaped marking on the occipital region; a diffuse, dark spot in front of the sacrum; a black canthal and a supratympanic streak; several distinct, black bars radiating from lower eyelid to upper lip; posterior part of the flank and groin with an orange brown spot that extends along the anterior part of the thighs to the knees; buttocks with several wavy lines and round spots; rest of the thighs orange brown on the posterior part; fore and hind limbs distinctly crossbarred with black; ventral surfaces speckled with brown; outer edge of tarsus and fifth toe with a light line.

Measurements. ♂ snout-vent 20; head breadth 7.5; head length 7.5; femur 10; tibia 10.5.

Remarks. This species agrees in some respects with *Eleutherodactylus inguinalis* Parker, 1940, from New River, British Guiana, but, as well as I can make out from the description of that species, it differs in several important characters. The head is definitely not depressed as described for *E. inguinalis,* but rather high and with very large, protruding eyes; the largest disks are not more than ⅓ the width of the eye (½ in *inguinalis*); the subarticular tubercles cannot be called prominent and there is no "black bordered inguinal ocellus."

Eleutherodactylus rozei is quite similar to *E. orocostalis,* from which it can be best distinguished by its coloration. In *E. rozei* the markings on the body, especially the thighs, are very distinct and contrasting, while in *E. orocostalis* the dorsal color is usually black or with obscure markings. Besides, the golden brown stains at the proximal anterior and distal posterior portions of the thighs of *E. rozei* are lacking in *E. orocostalis.* The snout of the latter is also more pointed and triangular.

Eleutherodactylus urichi (Boettger)

Hylodes urichi Boettger, 1894, Journ. Trin. Field Nat. Club, *2*: 88: Trinidad.

Eleutherodactylus gollmeri Schmidt, K. P. (not Peters), 1932, Zool. Ser. Field Mus. Nat. Hist., *18*: 159.

Eleutherodactylus bicumulus Schmidt, K. P. (not Peters), 1932, Zool. Ser. Field Mus. Nat. Hist., *18*: 159.

11 (C.N.H.M. 17777-87) Mt. Turumiquire, 7000-8000 ft., 32.

Description. Snout long, subovoid; tongue usually small, oval or spatulate, free and entire; vomerine odontoids in two very short and slightly oblique groups behind and between the choanae, their posterior extremities converging; interorbital space 1½ to 2 times broader than the narrow upper eyelid; eye diameter equal or slightly shorter than distance between eye and nostril; canthus distinct, usually curved; loreal moderately inclined, almost flat; tympanum small, ⅓ the eye diameter; metacarpal tubercles not very distinct; subarticular tubercles moderate, round; first finger shorter than second and with a much smaller disk; disks moderate, the largest almost as large as the tympanum; metatarsal tubercles small, the other very indistinct; toes free; heel of the adpressed hind limb extends to the middle of the eye. Skin above, smooth or with a slight tuberculation on

the posterior half (♂ ?); usually a small tubercle on the upper eyelid; flanks smooth or granular. Below, smooth on the throat and chest; very distinctly granular on the belly (with occasional exceptions) and finely or more coarsely granular on the thighs.

Color. Above, uniformly golden or purplish brown, very rarely with blotches or large spots; upper eyelids occasionally edged with white; thighs, groin and hidden portions of tibiae reddish. Color of the belly generally purplish between the lighter colored granules; throat and chest dirty white or brownish (reticulated in 17784, which is spotted above).

Measurements. Snout-vent ♂ 29, ♀ 31; head breadth ♂ 10, ♀ 11.5; head length ♂ 9.8, ♀ 11; femur ♂ 13.5, ♀ 13; tibia ♂ 14, ♀ 14.

Range. The eastern section of the Coastal Range. Trinidad and the Guianas.

Remarks. The Venezuelan *E. urichi* differs from topotypical material in its larger size (largest of 10 Trinidad specimens, snout-vent 24 mm.), longer and narrower snout, and in the absence of body markings in most of the specimens. Of 10 Trinidad specimens examined, all have a short, black supratympanic streak, 9 have distinct or indistinct crossbars on the hind limbs, 7 have vertical bars on the upper lip and 8 have some kind of markings above.

Of the 11 Venezuelan examples, only two have a slight supratympanic streak and distinct spotting of the dorsal surfaces. C.N.H.M. 17784 is strikingly different from the other specimens in coloration, but it agrees in most morphological characters.

Although the Venezuelan *E. urichi* probably represents a race, I have preferred to use the binomial until specimens from other northern South American countries have been examined.

Eleutherodactylus reticulatus Walker and Test

Eleutherodactylus reticulatus Walker and Test, 1955, Occ. Pap. Mus. Zool. Univ. Mich., No. 561: 4: Pico Periquito, Rancho Grande, 1275 m.

1 (U.M.M.Z. 109873, paratype) Rancho Grande, 1090 m., 51.

Description. Head broader than long; snout subovoid; tongue rounded, ⅓ free, slightly nicked behind; vomerine odontoids in two small, round and close together series between and just behind the small choanae; eye diameter as long as distance between eye and nostril; interorbital space as broad as an upper eyelid;

canthus distinct; loreal moderately oblique, concave; tympanum small, indistinct, ⅓ the eye diameter; a very slight supratympanic fold; two large tubercles at the angle of the jaw; a few very small tubercles at the elbow; one distinct humeral tubercle near the wrist; first finger shorter than second, which is shorter than fourth; an elongated large and a flattened divided outer metacarpal tubercle; disks somewhat indented at their free end, the largest larger than the tympanum; some very small tubercles at the heel; no tarsal fold or tubercle; an oval, rather prominent inner and a smaller, rounded outer metatarsal tubercle; subarticular tubercles rounded, not too prominent; disks of toes smaller than those of the fingers; heel of the adpressed hind limb extends to the tip of the snout. Skin above, smooth, except for an occasional tubercle; one distinct tubercle at each eyelid. Ventral surfaces granular on the throat, belly and posteroventral aspect of thighs.

Color. Above, grayish brown, with two darker blotches at the scapular region, one in the center, anterior to the sacrum, several small spots or dots at the coccygeal region, and other not so well defined mottles or freckles all over the dorsum; no apparent canthal streak; a narrow, not too distinct supratympanic streak; two dark lines radiating from eye to upper lip; anterior to this, another triangular labial spot; a few white, irregular spots at the groin; anterior and posterior aspects of the thighs equally dotted with white, on a chestnut background; rest of the hind limbs with diffuse, dusky crossbars. Below, brownish, reticulated with lighter, the hind limbs being darker and with better defined white dots; a series of white dots along the margin of the lower lip.

Measurements. ♀, snout-vent 35; head length 12.5; head breadth 13.3; femur 18; tibia 19.

Habits. Walker and Test state that some of the specimens were collected during the daytime under leaf litter, while another example was caught at night while sitting on the leaf of a plant at about four feet from the ground.

Range. Only known from the type locality.

Remarks. The tympanum of this species, although clearly evident, is not too distinct, its margins being more or less level with the skin surface.

The type is described as having a tubercular upper surface and a pair of short, crescentic glandular folds in the scapular region. The living coloration is said to be "clay brown, with blackish

markings on face, back, and legs; venter purplish black and white."

In general form of head and snout this species agrees with *E. güntheri* and *E. sancta-martae*, which, however, are very different in other respects. *E. fitzingeri* and *E. conspicillatus* which are also spotted on the posterior part of the thighs, have a good-sized, distinct tympanum and a long, subelliptical snout with a strong canthus rostralis.

Eleutherodactylus racenisi sp. n.

Figure 7

Type. Universidad Central de Venezuela No. 2014, a ♀ from El Junquito, D. F. Coll. Roze, 14 April 1951.

Fig. 7. *Eleutherodactylus racenisi* sp. n. Type U.C.V. 2014.

Diagnosis. A moderate sized *Eleutherodactylus* with oblique, posteriorly converging vomerine teeth situated behind the choanae; tympanum ⅓ the eye diameter; a small tubercle on the

distal portion of the radio-ulnar segment; first finger shorter than second; large, fan-shaped disks slightly larger than the tympanum and heel of the adpressed hind limb extending to the eye.

Description. Snout subovoid; tongue oval, slightly nicked and free behind; vomerine odontoids in two oblique, posteriorly converging groups behind the choanae; eye diameter equal to distance between eye and nostril; interorbital space slightly broader than an upper eyelid; canthus moderate, curved; loreal oblique, concave; tympanum ⅓ the eye diameter; two small tubercles at the angle of the mouth; a flat, indistinct supratympanic fold; a small tubercle on the distal portion of the radio-ulnar segment and one or two less distinct ones between this and the elbow; metacarpal tubercles indistinct; subarticular tubercles moderate, not very prominent; first finger shorter than second; disks large, fan-shaped; the largest slightly larger than the tympanum; a small tubercle at the heel; an oval, not very distinct, inner and a small, rounded, outer metatarsal tubercle; toes free; heel of the adpressed hind limb extends to the middle of the eye. Skin above, smooth, slightly tubercular in front and behind the tympanum; a transverse fold on each upper eyelid. Below, smooth.

Color. Above, brown with chocolate brown markings of irregular form; one marking forms a canthal streak, one crosses the intereanthal space in front of the eyes while others form a posteriorly diffuse spot between the eyes; a pagoda-shaped marking in front of the sacrum; a diffuse but extensive temporal spot that extends back on the flanks and a few radiating bars between lower eyelid and upper lip; anterodorsal part of the thighs with a row of rounded, white (pink or red?) spots from base to knee (in left thigh the spots are confluent and not well defined); upper part of the thighs with indistinct dark and light bars; posterior aspect uniform brown; forelimbs and rest of hindlimbs crossbarred. Ventral surfaces dusted with brown, the throat more profusely so than the rest of the body; tibial segment with a large, white (pink or red?) spot; tarsus dark brown; metatarsus wtih a light outer line that extends to the disk of the last toe.

Measurements. ♀ Snout-vent 36; head breadth 13; head length 12; femur 14.5; tibia 16.

Remarks. Eleutherodactylus raccnisi is somewhat similar in coloration to *E. briceni* but it differs from this species in having a narrower head, no elevation of the frontoparietals, slightly

smaller tympanum, and in other characters. It also bears some superficial resemblance to *E. megalops* of the Sta. Marta region of Colombia, and *E. reticulatus* of the Coastal Range of Venezuela. It can be distinguished from both by the smooth dorsum and venter, shorter hind limbs, different color of the thighs, and different position of the vomerine odontoids.

Eleutherodactylus marmoratus (Boulenger)

Hylodes marmoratus Boulenger, 1900, Trans. Linn. Soc. London, *8*: 56, pl. V, fig. 6: Mt. Roraima, 3500 ft.

5 (U.P.R. 214-18) Mt. Marahuaca, 4,050 ft., v.50.

Description. Snout short, subovoid to subelliptical; tongue oval, free and slightly nicked behind; vomerine odontoids forming two short, slightly oblique groups behind and between the round choanae, their posterior extremities directed inwards; interorbital space broader than an upper eyelid; eye diameter as long as distance between eye and nostril; canthus distinct; loreal almost straight, concave; tympanum small, not more than ⅓ the eye diameter; metacarpal tubercles slight, subarticular tubercles rounded, moderate; fingers free, the first shorter than second; disks truncate, of about the same size as the tympanum; metatarsal tubercles small, the inner a little more oval than the outer; toes free; heel of the adpressed hind limb extends to between eye and nostril. Skin above generally sparsely tubercular; loreal region granular; flanks, belly and ventral surface of the thighs granular; a transverse pectoral fold. Male with a large, subgular vocal sac.

Color. Above, brownish gray with darker, sometimes obscure spots; upper eyelids dark; a black supratympanic streak; two black, curved, longitudinal lines from near the upper eyelid toward the scapular region; a few, sometimes indistinct bars radiate from eye to upper lip; hind limbs crossbarred; ventral surfaces white or greenish white, immaculate.

Measurements. Snout-vent ♂ 17.5, ♀ 22; head breadth ♂ 6, ♀ 8; head length ♂ 6.2, ♀ 7.9; femur ♂ 7.7, ♀ 10.1; tibia ♂ 9, ♀ 11.

Habits. Collected at night in shrubs and small trees where their voices were heard but could not be recorded.

Remarks. Two of the three male specimens are longitudinally striped with brown, but they were taken in the same place, and morphologically they agree with the other three examples.

The non-striped male was sent to Dr. Parker for comparison with the type. He pronounced it conspecific with the Roraima form.

See remarks under *Otophryne robusta*.

Eleutherodactylus anotis Walker and Test

Eleutherodactylus anotis Walker and Test, 1955, Occ. Pap. Mus. Zool. Univ. Mich. No. 561: 7: Rancho Grande, 1090 m.

1 (U.M.M.Z. 109877, paratype) Rancho Grande, 1090 m., 51.

Description. Head broader than long; snout subovoid; tongue rounded, ⅓ free, indistinctly nicked behind; vomerine odontoids round, transverse, close together and immediately behind the small choanae; eye diameter as long as distance between eye and nostril; interorbital space as broad as an upper eyelid; canthus rostralis distinct; loreal region little oblique, concave above; tympanum completely hidden; a slight fold above its site; a few tubercles at the elbow and three or four very indistinct ones along the posterior side of the arm; a palmar and an inner metacarpal tubercle; subarticular tubercles rounded, not very protuberant; first finger shorter than second, which is shorter than fourth; disks moderate; a few slight tubercles at the heel; no tarsal fold; inner metatarsal tubercle elongated, outer rounded, conical; toes free, their disks smaller than those of the fingers; heel of the adpressed hind limb extends to between eye and nostril. Skin above, rugose and tubercular, especially behind the angle of the jaw, in the temporal region and anterior, upper flanks; a few tubercles at the upper eyelid; some tubercles elongate and form a rough W-shaped figure behind the nape. Below, with slight granulation on the venter and posteroventral aspect of the thighs.

Color. Above, grayish brown, with irregular mottling and dusting, lighter on the snout, in front of a narrow, posteriorly diffused interorbital line; loreal region with dark brown bars that radiate from eye to upper lip; anterior and posterior aspect of the thighs uniform, with some infuscation; limbs crossbarred. Below, brownish white, with greater infuscation on the limbs, throat and anterior belly, where light points and reticulations can be seen; a series of white dots margin the lower jaw.

Measurements. ♀ Snout-vent 41; head length 15; head breadth 16; femur 20.5; tibia 23.5.

Habits. During the day *E. anotis* hides in rock crevices and at night comes out and is found on rock outcroppings in or near streams (Walker and Test, *op. cit.*).

Range. Known only from within 1 km. of the type locality and from a stream beside the Maracay-Charoni road, at 1300 m.

Remarks. According to Walker and Test, there seems to be little structural variation in the species. The head in the larger individuals is broader than in the smaller ones and the heel may reach to the tip of the snout. A narrow dorsolateral fold that extends from above the shoulder halfway to the groin is described for the type but is not evident in paratype U.M.M.Z. 109877. Neither is an ill-defined femoral ocellus or a distinct dorsal triangular blotch. One of the immature specimens available to Walker and Test had a broad, light, vertebral stripe.

The coloration of the living animal is described as follows: dorsal surfaces greenish to olive, sometimes overlaid with reddish cinnamon, or with scattered, pale gray flecks; posterior part of the belly and underside of the thighs and shanks reddish, coral red or brownish salmon.

Other large *Eleutherodactylus* without tympanum are *E. ventrivittatus* Andersson,[1] *E. surdus* (Boulenger) and *E. roseus* (Boulenger).

E. ventrivittatus is distinctly marbled below and has white and black thigh bars; *E. surdus* (from W. Ecuador) has a smooth skin, chevron-shaped markings on the back and white spots on the posterior aspect of the thighs, while *E. roseus* has a very oblique loreal region, smooth dorsal skin, a white streak on the canthus and edge of the upper eyelid and pink spots on upper eyelids and flanks. *E. whymperi* (Boulenger) does not have a tympanum but it is a relatively small, compact and rotund form with no similarity to *E. anotis*. Lutz and Kloss described *E. carvalhoi* from the Alto Solimoes, Amazonas, apparently from immature specimens without exposed tympanum. This species has a vertical loreal region and a light spot on each flank, at the lumbar area.

Included under this species are U.C.V. 44, from El Junquito, and U.C.V. 2008-9 from La Culebra, Edo. Miranda. These specimens have a small, indistinct tympanum, but this may be a sign of immaturity in this species, as all three examples agree with adult *E. anotis* in other important morphological characters, and in some details of their distinct coloration.

[1] Perhaps a synonym of *E. ventrimarmoratus* (Boulenger), although this species is described as having a small tympanum. M.C.Z. 19643-7 and 24437 are probably referable to this species, although determined as *E. latidiscus*. The smaller specimens of these do not have any apparent tympanum, are very tubercular above, have comparatively smaller disks and show a uniform ventral surface.

U.C.V. 44 is only 9 mm. long. The color above is greenish gray, with a dark green spot on the middle of the body, in front of the sacrum; the loreal region and tip of the snout are coral red; the limbs, coral red, crossbarred with dark grayish green; there is a whitish area at the knee, and the ventral surfaces are much infuscated on the throat and anterior part of the belly. In coloration, this little frog looks more like a gaudy, coral reef crab than an *Eleutherodactylus*.

U.C.V. 2009 is reddish or brownish gray with darker mottlings on the upper flanks and dorsolateral region, and it has a greenish, well defined interscapular spot and another spot of the same color on the middle of the sacral region; the venter is salmon red. In No. 2008 the general dorsal color is gray with irregular spots of different shades of gray and a light green interorbital spot; the hind limbs are crossbarred except for the distal portions of the tibiae, which are of a contrasting milky white color; the distal portion of the femur and proximal part of the tibia is blackish; the distal portion of the tibia and most of the tarsus, white. The peculiar coloration of these small frogs make them look as if they were covered with lichens.

Key to the Species of CERATOPHRYS *Recorded from Venezuela*

I. Toes ⅓ webbed; heel of the adpressed hind limb extends to the tympanum; inner metatarsal tubercle shovel-shaped, with a sharp edge; no orange or red on the back ..... *calcarata*

II. Toes ⅔ webbed; heel of the adpressed hind limb extends to between eye and nostril; inner metatarsal tubercle oval, blunt; orange and red on the back ..... *cornuta*

CERATOPHRYS CALCARATA Boulenger

Ceratophrys calcarata Boulenger, 1890, Proc. Zool. Soc. London: 327, pl. xxvi: Colombia.

1 (U.P.R. 196) Territorio Amazonas, i.48.

1 (U.P.R. 197) Pto. Ayacucho, vi.50.

Description. Head much broader than long, bony and very high; snout short and rounded; tongue rounded, slightly emarginate and free behind; "vomerine odontoids" present as small patches in front of the large, transverse choanae of the male, absent in the female; eye diameter a little shorter than distance between eye and nostril; nostril closer to the eye than to the tip of the snout; a longitudinal frontal furrow; interorbital space

concave, as broad as an upper eyelid; a triangular dermal appendage and several other smaller papillae on the upper eyelid; canthus descending almost vertically to the tip of the snout; loreal slightly sloping; tympanum not very distinct, rather more than ½ the eye diameter; a flat and broad, bony supratympanic ridge; a slight glandular ridge along the forearm; a large but somewhat diffuse outer and a smaller oval inner metacarpal tubercle; fingers free, the first stronger and longer than second; last finger scarcely extending to the penultimate articulation of the longest third; a distinct tarsal fold; a horny spade-like, inner metatarsal tubercle, the outer absent or indistinct; subarticular tubercles of toes moderate, smaller than those of the fingers; toes about ⅓ webbed; heel of the adpressed hind limb extends to the tympanum. Skin above, rugose and warty, the larger warts with longitudinal ridges; flanks and ventral surface of the body and thighs granular.

Color. Above greenish gray or whitish with olive green markings; a dark green, usually T-shaped spot in the frontal furrow; several radiating bars from eye to upper lip; two light-colored broad lines originate on the eyelid appendages, meet in front of the occipital region and continue posteriorly to the anus, sending ramifications between the darker spots of the body; in the sacral region this stripe is usually divided by an oval, central spot; a pair of externally concave, reniform spots between the supraorbital ridges and the central longitudinal stripe; limbs crossbarred. Ventral surfaces yellow white, with brown variegations; lower lip with a series of dark, elongated spots that usually extend to the region of the anterior girdle.

Measurements. ♀ Snout-vent 79; head breadth 45; head length 31; femur 27; tibia 22.

Habits. While in San Fernando de Atabapo I heard of a woman in Puerto Ayacucho who had been bitten by a poisonous toad when she went out at night to get a chicken in her yard. Upon returning to Puerto Ayacucho a reward was offered for the "poisonous toad" and when a man appeared with a "sapo de cachos" tied to a string, the animal was shown to Justina Maurique for identification. That was, in effect, the supposed poisonous animal, but since the small teeth failed to penetrate the skin of my finger, she insisted that the toad loses its poisonous properties when kept in captivity. The animal was always aggressive and held on to a stick with the tenacity of a bulldog. Justina still showed a pair of punctures on the ankle and it might

be supposed that she was the victim of a poisonous snake which was approaching the toad. On being questioned if she knew the toad to be poisonous she answered that she had heard of a poisonous "sapo" with "horns" but had never seen one before. The doctor who was said to have attended her and who "gave her some shots" could not be found.

The other ♀ specimen (U.P.R. 196) was obtained through the courtesy of Dr. Hans Baumgardner of Puerto Ayacucho, who said that the toad was common in ditches and on a nearby granite hill, where, after rain, water accumulated in depressions. Although a whole night was spent searching for them, no *Ceratophrys* could be found on this hill nor in any other place in Puerto Ayacucho.

Range. The Venezuelan Guayana and probably the Llanos, the coastal belt, the Falcón Region and the lower Maracaibo Basin, northeastern Colombia and perhaps the southern Guianas and the savannas of N. Brasil. The presence of this species in Santa Marta region of Colombia and in Puerto Ayacucho may indicate that it is also found in the Llanos and in the arid and semiarid regions of N. Venezuela. It is not known by the people of San Fernando de Atabapo, an indication that its distribution is affected by the higher humidity and other ecological factors of this region.

Remarks. Adolpho Lutz, (1927:40) records seeing a *Ceratophrys* from Venezuela but failed to obtain specimens and was uncertain whether the frog was a *calcarata* or *cornuta.* It might well have been an *Eleutherodactylus cornutus maussi.*

The Venezuelan animals seem to have a higher head and a shorter and more rounded snout than the specimens from northeastern Colombia. A male of this latter group has the following measurements: snout-vent 72; head breadth 45; head length 33; femur 24.3; tibia 23. A vocal sac is present and is generally dark in color.

No vomerine teeth have been detected between the choanae but the male toads from Colombia have two whitish patches far in front of the openings. These are well raised and represent protuberances of some bone, but as the head of this form is so much compressed from back to front, it is possible that the cranial bones are equally modified or moved and these odontoids may actually come from the vomer, although their position is closer to that of the premaxillary of normal forms. The matter is under investigation.

Ceratophrys cornuta (Linné)

Rana cornuta Linné, 1758, Syst. Nat., ed. 10: 212: Virginia (in error).
Ceratophrys cornuta Ernst, A., 1877, Flora y Fauna de Ven.: 281; Röhl, E., 1949, Fauna Descr. de Ven., ed. 2: 406, fig. 185.

No material examined.

Original Description. (Based on Seba *1*, pl. LXXII, figs. 1, 2.) Eyelid conical; aspect horrible.

Color. According to Röhl: above green, brown and black, with an orange stripe that extends from the head to the end of the dorsum; shoulders reddish green; hind limbs green, streaked with lighter green. Jiménez de la Espada (1875: 32) speaks of an irregular mixture of orange, red, purple and dark chestnut spots on the dorsum, with emerald green and purple bars alternating on the sides of the head and limbs (*C. megastoma*).

Range. ?Venezuela. Surinam, Brasil, Bolivia, Ecuador.

Remarks. There is no doubt that the color description given by Röhl is not that of *Ceratophrys calcarata* nor of *Eleutherodactylus cornutus maussi*, the other species with which it could be confused. I feel, however, very uncertain about the identity of this animal and about its presence in Venezuela. The A.M.N.H. has British Guiana specimens under this name (not examined) and its occurrence in this country has been confirmed by Crawford (1931: 11).

Like Boulenger (1882), Crawford speaks only of a grayish color, the head and back with dark markings and the flanks marbled with brown. I believe *C. calcarata* may extend to British Guiana, and it is not improbable that these records may refer to that species and not to *C. cornuta*.

According to Röhl the common name for this species in Venezuela is "rana cornuda."

Pseudopaludicola pusilla (Ruthven)

Paludicola pusilla Ruthven, 1916, Occ. Papers Mus. Zool. Univ. Mich., No. 30: 1-3: Fundación, Colombia.
Paludicola exigua Boettger, 1896, Ber. Senckenb. Naturf. Ges.: LIV.

12 (U.P.R. 237-45, 247-9) Pto. Ayacucho, vi.50.
2 (U.P.R. 252, 254) Pto. Ayacucho, vi.50.

Description. Snout subovoid or subelliptical; tongue narrow, somewhat pyriform, entire and free behind; eye diameter greater than distance between eye and nostril but shorter than the snout; interorbital space equal to, or a little broader than an upper eyelid; canthus rounded; loreal oblique, concave; tympanum hidden;

one distinct and one or two other less prominent tubercles between elbow and wrist; subarticular tubercles large, rounded, that of the inner finger much larger than the others; fingers free, first shorter than second; tips of fingers swollen; usually a tubercle at the heel; an oblique tarsal fold that commences with a tubercle at the middle of the tarsus; metatarsal tubercles small but very prominent, the outer commonly pointed; subarticular tubercles of toes prominent; toes with a short web that extends to the small disks as distinct lateral fringes; heel of the adpressed hind limb extends to the middle or anterior corner of the eye. Skin above, generally rugose and warty (apparently smooth in females); a flat, oblique and indistinct fold from lower eyelid to base of the humerus. Below, smooth. Male with two slight subgular vocal sacs.

Color. Above, brown or dark grayish-brown, generally with darker spots or large yellowish blotches that may cover most of the dorsum; an occasional specimen with a greenish yellow vertebral stripe; upper lip vertically spotted with white; a dark longitudinal line along the posteroventral part of the thighs. Below, white, immaculate or speckled with brown, especially on the throat and limbs.

Measurements. Snout-vent ♂ 12, ♀ 17; head breadth ♂ 4.6, ♀ 5; head length ♂ 4.9, ♀ 6; femur ♂ 5.5, ♀ 7; tibia ♂ 5.7, ♀ 7.

Habits. All the 12 males were caught on the sandy shores of a stream. There was small and sparse forest growth on the margins, deep forest upstream, and savannas nearby. The two gravid females were found in a grassy savanna near a large granite outcropping. For a good illustration of the habitat of this animal and probably the exact location where the two females were collected, the reader is referred to Hitchcock (1947, fig. 13).

The tremendous jumps that this little animal is capable of performing make it extremely difficult to catch. Sometimes on opening one's hand expecting to see the frog, one finds only dust and leaves, for the little animal is jumping several feet away.

Additional Localities. Pto. Ayacucho nr. Venado (U.S.N.M. 80674); nr. Rosario (U.S.N.M. 115760-7); Upper Orinoco (Boettger, 1896).

Range. The Venezuelan Guayana (lower extension of the Llanos into Pto. Ayacucho), the arid and semiarid Maracaibo Basin and probably the Llanos, the Falcón Region and the coastal belt. Northeastern Colombia across central and southern

Venezuela to British Guiana. It probably occurs also in the Llanos of Colombia, the savanna country of the eastern Guiana and in N. Brasil.

Remarks. The two females from Pto. Ayacucho have a more pointed and longer snout than the males, and since both of them are full of eggs, the heel scarcely reaches the shoulder.

Very little difference has been found between this species from southern Venezuela and a paratype from Colombia. There is only one tubercle on the forearm of the latter.

Six specimens from Inírida in the Senckenberg Museum (*Paludicola exigua* Boettger, 1896) were found to represent this species.

Paludicola fischeri Boulenger

Paludicola fischeri Boulenger, 1890, Proc. Zool. Soc. London: 327, pl. xxv, fig. 2: Venezuela; Nieden, 1923, Das Tierreich. Anura I: 512.
Paludicola Fischeri Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 39, 46.

No material examined.

Description. Parker (1927:473) has placed *Paludicola fischeri* under the synonymy of *Physalaemus gracilis* Blgr., stating that he has been unable to find any character by which to distinguish the two species or any data to confirm the locality. Since *Physalaemus gracilis* is a southern form not likely to occur in Venezuela, it should not be included for the present in the fauna of this country. *A Physalaemus*[1] has been taken by Dunn at Villavicencio and Llanos de Boyacá of Colombia (1944a: 512). Probably this form will also be found in Venezuela.

Pleurodema brachyops (Cope)

Pleurodema bibroni var. B. Günther, 1858, Cat. Batr. Sal. Brit. Mus.: 32.
Lystris brachyops Cope, 1868, Proc. Acad. Nat. Sci. Phila.: 312: Magdalena R., Colombia.
Pleurodema Sachsi Peters, 1877, Monatsb. Berl. Akad. Wissensch.: 460.
Paludicola brachyops Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., ed. 2: 232; Boettger, 1893, Ber. Senckenb. Naturf. Ges.: 40.
Pleurodema brachyops Nieden, 1923, Das Tierreich, Anura, I: 499; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 39, 46, pl. 11, fig. 17; Parker, 1927, Ann. Mag. Nat. Hist., (9) *20*: 473; Schmidt, K. P., 1932, Zool. Ser. Field Mus. Nat. Hist., *18*: 160.

2 (U.S.N.M. 115757-8) Campo del Lago, Lagunillas, iv.42.
1 (U.S.N.M. 36371) Chicara (Caicara?), 05.

[1] I have been unable to find to what species Dunn referred.

5 (U.S.N.M. 117525, 128841-4) Sierra de Sta. Ana, Falcón, 39.
1 (U.S.N.M. 128840) Palenque, iii.39.

Description. Snout short and rounded; nostrils closer to the tip of the snout than to the eye; tongue oval, entire or indistinctly nicked behind; vomerine odontoids in two short, oblique groups between the choanae, their posterior extremities directed inwards; eye diameter as long as the snout; interorbital space equal or narrower than an upper eyelid; canthus rounded; loreal almost vertical, not concave; tympanum not very distinct, about ½ the eye diameter; metacarpal tubercles oval, distinct; fingers free, the first a little longer than second which may be slightly longer than fourth; subarticular tubercles of fingers and toes very prominent; tips of fingers swollen; two sharp, inwardly directed, shovel-shaped, metatarsal tubercles; toes with a slight web that extends to the tips as thick lateral fringes; heel of the adpressed hind limb extends to the shoulder. Skin above, with scattered small warts and short glandular ridges; two prominent and relatively large lumbar glands. Below, smooth. Male with a subgular vocal sac.

Color. Above, light yellowish brown or gray, marbled and spotted with darker brown; a dark spot under the eye; sometimes a vertebral stripe; lumbar glands blackish brown, spotted with pink (red?); inguinal region, underside of the tibiae and a transverse spot at the knee, pink.

Measurements. Snout-vent ♂ 31.5, ♀ 34.5; head breadth ♂ 13, ♀ 13.5; head length ♂ 10.5, ♀ 10.5; femur ♂ 12, ♀ 11; tibia ♂ 12.5, ♀ 13.

Additional Localities. Caracas (Boettger, 1892); Cocollar (C.N.H.M. 17783 [=Schmidt, 1932]); Distrito Acosta (C.N.H.M. 25898); Maracay (Lutz, 1927); Sn. Fdo. de Apure (Peters, 1877); Venezuela (U.S.N.M. 36372-5; Günther, 1858; Boulenger, 1882; Boettger, 1893; Nieden, 1923).

Range. The arid and semiarid Maracaibo Basin, the coastal belt, the Coastal Range and the Llanos. Northeastern Colombia and the islands north of Venezuela to British Guiana and northern Brasil. Dunn (1944) says it also occurs in Panamá.

Remarks. There seems to be considerable variation in the coloration of this form. Some have a canthal streak, others vertical spots on the upper lip, a vertebral stripe or black color extending outside of the lumbar gland. In the specimen from Cocollar there are a very few light spots in these glands. I failed to detect vomerine teeth in U.S.N.M. 115758.

Eupemphix pustulosus ruthveni Netting

Engystomops pustulosus Boettger, 1892, Kat. Batr. Samm. Mus. Senckenb.: 33.

Eupemphix pustulosus Boettger, 1893, Ber. Senckenb. Naturf. Ges.: 40; Alemán, 1952, Mem. Soc. Cienc. Nat. La Salle, *12*: 26, fig. 6.

Eupemphix pustulosa Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 38, 42, pl. xii, figs. 25, 26.

Eupemphix ruthveni Netting, 1930, Ann. Carneg. Mus., *19*: 167, pl. vii, fig. 1: Fundación, Colombia.

1 (U.M.M.Z. 55555) La Fría, Pueblo Nuevo.

1 (U.M.M.Z. 57398) Sta. Elena, Mérida.

Description. Snout triangular; tongue small, narrow, entire and free behind; choanae small, round; eye diameter more or less equal to distance between eye and nostril; interorbital space about 1½ times broader than an upper eyelid; tympanum very indistinct, almost hidden; parotid triangular, mostly lateral and not very distinct; canthus angular; loreal vertical, not concave; subarticular tubercles quite distinct and prominent; fingers free, the first slightly shorter than second; fingers and toes distally swollen; a conical tubercle on the middle of the tarsus; metatarsal tubercles moderate, sometimes pointed; toes practically free; heel of the adpressed hind limb extends to the eye. Skin above, covered with round and elongated warts; a small lateral gland on each side between axilla and groin. Belly slightly granular. Male with a large subgular vocal sac.

Color. Above, brown or dull, dark gray with obscure darker markings that occasionally follow some of the rows of warts; a short, greenish-yellow vertebral stripe from tip of urostyle to sacrum or slightly beyond; limbs spotted or crossbarred. Throat, chest and anterior part of the belly infuscate, with a median greenish-yellow line that extends to the light-colored hinder portion of the belly; this is marked with distinct round spots. The ventral surface of the hind limbs may be slightly spotted.

Measurements. Snout-vent ♂ 25, ♀ 28.5; head breadth ♂ 8, ♀ 9; head length ♂ 7, ♀ 7.5; femur ♂ 10, ♀ 11; tibia ♂ 11, ♀ 11.5.

Additional Localities. Caracas (Boettger, 1892); Caripito (U.S.N.M. 11792-7); El Sombrero (U.C.V. 34); Espino (U.C.V. 67); Maracay (Lutz, 1927); Ocumare del Tuy (U.C.V. 7-8); Pie del Cerro (U.S.N.M. 121149); Puerto Cabello (Boettger, 1893); Sta. Lucía (U.S.N.M. 121150-1); Turgua (Alemán, 1952).

Remarks. In ventral coloration the two specimens from Maracaibo Basin are somewhat intermediate between the typical form and the animal that occurs in central and eastern Venezuela. The latter are usually smaller and their bellies uniformly colored behind. I am uncertain whether the Venezuelan form deserves to be separated from *E. p. trinitatis,* but Netting has examined quite a number of specimens and insists on their distinctness. Probably the Trinidad frogs are not more divergent from the animals of eastern Venezuela than these are from those of the west.

The male specimen measured (U.C.V. 34) is not one of the two specimens on which the description was based. Except for the darker color of the external vocal sac, this animal is plain below. It does not have ventral or vertebral stripes. In some examples the venter is smooth while in those from north central Venezuela the dorsal stripe does not reach the sacrum and may be very short or even absent.

PSEUDIDAE

Pseudis paradoxus (Linné)

Rana paradoxa Linné, 1758, Syst. Nat., ed. 10: 212: Surinam.

Pseudis paradoxa Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 39, 44, pl. xi, figs. 18, 19.

No material from Venezuela.

1 (M.C.Z. 2557) British Guiana.

2 (M.C.Z. 12135-6) Coast Lands, Demerara, British Guiana.

Description. Head flat, much broader than long; snout short, rounded to subovoid; tongue broad, rounded, entire or slightly nicked and free behind; vomerine odontoids in two prominent transverse groups between the small choanae; eyes small, their diameter equal to distance between eye and nostril; interorbital space at least twice as broad as the narrow upper eyelid; tympanum not very distinct, ¾ or more of the eye diameter; canthus flat and indistinct; loreal sloping, concave; no prominent supratympanic fold; a row of small tubercles along the forearm; fingers free, the first opposed to the others; subarticular tubercles of the fingers small, but larger and more distinct than those of the toes; a prominent tarsal fold; a very prominent, almost spurlike (not cornified), inner metatarsal tubercle, the outer absent or indistinct; toes broadly webbed to the tips; tips of fingers and toes slightly expanded; heel of the adpressed hind

limb extends to the eye. Skin above, smooth, with some glandules on the flanks. Below, smooth, including the thighs; a distinct fold at the knee and another at the heel.

Color. Above, yellowish brown or dark brown with peculiar elongated spots and occasionally minute points; limbs with large dark spots; flanks and posterior part of the thighs with yellow spots. Below, yellow, with scattered, small, brown spots on the belly and larger more elongate ones on the throat and chest; an oblique, long, brown line or spot on each side of the breast; thighs with pretty, longitudinal spots; tibiae and tarsi marbled; two innermost toes usually yellow.

Measurements. Snout-vent ♂ 57, ♀ 66; head breadth ♂ 20, ♀ 24; head length ♂ 18, ♀ 19; femur ♂ 31, ♀ 35; tibia, ♂ 32, ♀ 36.

Habits. According to Lutz, these frogs "rarely come out of the water where they are not easily caught, though they can be taken by angling. The call of *P. paradoxus* is a characteristic croak."

Additional Localities. Maracay (Lutz, 1927). According to Ditmars (*The Making of a Scientist,* 1938: 245) tadpoles of this species were discovered in "certain lakes of Venezuela." I have not found any reference to this collection, but Savage and Carvalho (1953: 195) mention eastern Venezuela as part of the range of the species.

Range. Maracay and E. Venezuela. Trinidad and the Guianas, south to Paraguay and Argentina.

Remarks. The genus *Pseudis* was originally included in the Leptodactylidae. In 1935 Parker suggested that, on account of its possessing an extra phalanx in each digit (which may be an enlarged interealary phalanx), *Pseudis* should probably be included in the Hylidae. In a recent paper, Savage and Carvalho (1953) have erected a new family for those frogs with an extra phalanx in their digits.

HYLIDAE

Key to the Genera of Venezuelan Hylidae

I. Pupil horizontal; toes webbed.
   A. Female with a dorsal pouch in which the eggs are carried, derm of head involved in cranial ossification or, if not, first finger equal or longer than second.
      1. Size small (25 mm.); dorsal pouch opening by a longitudinal slit; fingers free; first finger longer than second . . . . *Nototheca*

2. Size large (50 mm.); dorsal pouch opening by two longitudinal or crescent shaped slits on the posterior half of the dorsum; fingers webbed ..... *Gastrotheca*

B. Female without a dorsal pouch; first finger shorter than second (except in *Hyla marahuaquensis*).

1. Derm of head involved in cranial ossification *Corythomantis*
2. Derm of head free ..... *Hyla*

II. Pupil vertical ..... *Phyllomedusa*

Key to the Species of Hyla *Reported from Venezuela*

I. Choanae large, vomerine odontoids in two groups forming together a ⌒ or a /\.[1]

A. Outer finger with not more than 2 free phalanges.

1. An external rudiment of pollex.

a. Outer finger fully webbed (1 phalanx = disk free); tympanum ⅔ the eye diameter; heel to between eye and nostril or tip of the snout; brown above; a row of dark spots along the flanks; 75 mm. ..... *boans*

b. Outer finger with 1½ free phalanges; tympanum ⅔ the eye diameter; heel to the tip of the snout; purple brown with dark scribblings above; lower eyelid with metallic venation; bones green; 75 mm. ..... *wavrini*

c. Outer finger with 2 free phalanges; tympanum ½ the eye diameter; heel to tip of the snout or beyond; a pair of dorsolateral folds from eyes to groin; apple green (when alive) or closely dotted with brown (preserved) above; 50 mm. ..... *albomarginata*

d. Outer finger with 2 free phalanges; tympanum ½ the eye diameter; heel to anterior corner of the eye or between eye and nostril but not beyond; no dorsolateral folds; green (when alive) occasionally with peculiar brown spots or yellowish white (preserved) above; 40 mm. ..... *granosa*

2. No distinct rudiment of pollex.

a. Outer finger with 1½ to 2 free phalanges; tympanum ⅔ the eye diameter; heel to tip of snout; snout broad but pointed; usually an X-shaped figure on the anterior part of the dorsum; 60 mm. ..... *geographica geographica*

B. Outer finger with more than 2 free phalanges (a basal or rudimentary web).

1. Tympanum distinct, ½ or more the eye diameter.

a. An external rudiment of pollex.

1. Tympanum at least ¾ the eye diameter; snout moderate, subovoid; loreal region moderately oblique;

[1] In *H. paramica*, *H. jahni* and *H. platydactyla* the vomerine teeth are very slightly oblique and on occasion may be almost transverse.

larger disks about ½ the size of the tympanum; light brownish above, usually with a large, diffuse, darker spot; flanks and thighs with fine crossbars *supplicata*

2. Tympanum ¾ the eye diameter; snout long, subelliptical; loreal region almost vertical; brown, usually with transverse bands above . . . . . *albopunctata multifasciata*

3. Tympanum ½ the eye diameter; snout short, subovoid; largest disks larger than the tympanum; marbled with reddish brown and dark gray above; flanks with small, white spots . . . . . *loveridgei*

b. No distinct rudiment of pollex.

1. Tympanum ⅔ the eye diameter; largest disks about ⅓ the size of the tympanum; brown, usually vermiculated with darker above; a supra-tympanic streak that extends for a short distance posteriorly; thighs with distinct, broad crossbars . . . . . *raniceps*

2. Tympanum almost as large as the eye; a pair of longitudinal ridges on the head (margins of the frontoparietals elevated); largest disks almost as large as, or larger than, the tympanum; profusely (♂) or sparsely (♀) tubercular above; male with two lateral vocal sacs; brown above, sometimes with darker markings . . . . . *taurina*

2. Tympanum indistinct or absent; where present, not quite ½ the eye diameter (usually ⅓).

a. Snout almost semicircular; vomerine odontoids very slightly oblique; canthus not well defined; no distinct supratympanic fold; above, whitish, usually with scattered melanophores; no light canthal or supratympanic streaks; usually orange drab below; 31 mm.; Andes . . . . . *paramica*

b. Snout subovoid; vomerine odontoids slightly oblique; a supratympanic fold; above brownish, closely punctulated with darker brown or white (after long preservation) or uniformly whitish; a light canthal, palpebral and supratympanic lines; 34 mm.; Andes . . . . . *jahni*

c. Snout subovoid; vomerine odontoids slightly oblique; a supratympanic fold; above, purple, closely dotted with darker; arms and thighs white, with a stripe of closely set dark purple dots; 32 mm.; Andes . . . . . *platydactyla*

d. Snout subovoid; vomerine odontoids distinctly oblique; a distinct rudiment of pollex; color above brownish with darker transverse bands or uniform and with reticulations; ventral surfaces orange (when alive) or whitish (preserved); 37 mm.; Guayanan Cerros . . . . . *benitezi*

II. Choanae small or moderate; vomerine odontoids in two groups, transverse or obliquely directed backwards and inwards.

A. Fingers free.
  1. First finger slightly longer than second.
    a. A light dorsolateral line that meets its opposite in a slight, backward notch between the eyes; 27 mm.; Guayanan Cerros ..... *marahuaquensis*
  2. First finger shorter than second.
    a. Tympanum ⅔ to ¾ the eye diameter; snout long, subovoid; heel to the eye; above, brown or gray, sometimes with two long, longitudinal spots behind the eyes and white spots on the anterior and posterior part of the thighs; 38 mm. ..... *rubra*
    b. Tympanum ⅔ the eye diameter; snout very long, subacuminate; heel to between eye and nostril or tip of the snout; brown or dark gray with a triangular spot between the eyes and usually other dark markings on the scapular region; thighs with alternating black and reddish bars on the anterior and posterior aspects; 40 mm. ..... *boulengeri*
    c. Tympanum ½ the eye diameter; snout subovoid; heel to the eye; above, chlorine green (when alive) or yellowish gray (preserved); anterior and posterior part of the thighs of uniform color; 28 mm. ..... *baumgardneri*

B. Fingers webbed.
  1. Tympanum absent.
    a. A white or yellow spot below the eye; upper surface of the thighs with white or yellow spots; 31 mm. ..... *luteocellata*
  2. Tympanum present, ½ or more the eye diameter.
    a. Outer finger fully webbed (1 phalanx = disk free).
      1. Snout almost semicircular; odontoids in an inverted chevron; forearm and tarsus with a festooned fringe; above, marbled with different shades of gray and brown; below orange (when alive) or white (preserved) with round, black spots; 35 mm. ..... *m. marmorata*
    b. Outer finger not fully webbed.
      1. Tympanum ⅔ the eye diameter; snout rounded; loreal sloping; heel to the eye; skin with scattered glandules and tubercles especially in the surroundings of the tympanic region; male with two vocal sacs at the angle of the mouth.
        a. Size very large; color above more or less uniform; skin very thick and glandular; Maracaibo Basin ..... *tibiatrix ingens*
        b. Size smaller; color above not generally uniform; skin not as thick and glandular as above; Venezuela, except Maracaibo Basin ..... *tibiatrix tibiatrix*
      2. Tympanum ½ the eye diameter; snout rounded; heel to the eye; skin above smooth; above, slate or bronze colored; anterior and posterior part of the thigh and lower

surface of the hind limbs spotted with white; 42 mm.; Andes . . . . . *vilsoniana meridensis*

3. Tympanum ⅓ the eye diameter; snout almost semicircular; eye diameter greater than distance between eye and nostril; heel to between eye and nostril; no tarsal fold; skin above, smooth; above, straw colored, generally with ornate, light margined markings of irregular shape; no dark canthal or supratympanic streaks; a transverse, distinct, light line above the anus and another longitudinal one at the heel; 26 mm.; Venezuelan Guayana . . *minuta*
4. Tympanum ½ the eye diameter; snout rounded; eye diameter greater than distance between eye and nostril; a tarsal fold; heel to between eye and nostril; skin above, smooth; brownish with obscure longitudinal markings; a canthal and a supratympanic streak; no distinct light line above the anus or at the heel; 20 mm.; Coastal Range . . . . . *misera*
5. Tympanum ½ the eye diameter; snout pointed and projecting; loreal vertical; a slight tarsal fold; heel to anterior corner of the eye; skin above, shagreened, yellowish white in preservation; two horizontal flaps at the sides of the anus; 24 mm.; Venezuelan Guayana . . . . . *orophila planicola*
6. Tympanum ⅓ the eye diameter; snout rounded; heel to between eye and nostril; skin above, smooth; above and on the ventral surface of throat and limbs distinctly dotted with brown; 33 mm.; Coastal Range . . *battersbyi*

Hyla boans (Linné)

Rana boans Linné, 1758, Syst. Nat., ed. 10: 213: America.

Hyla maxima Boettger, 1896, Ber. Senckenb. Naturf. Ges., LIV; Fowler, 1913, Proc. Acad. Nat. Sci. Phila., *65*: 170; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 40, 47.

1 (U.P.R. 109) La Culebra, 1000 ft., iv.50.
1 (U.P.R. 110) Caño Chupadero, iii.50.
1 (U.P.R. 111) Anabén, Colombia, vi.50.
1 (M.C.Z. 19918) Orinoco R., below Caroní, i.35.

Description. Head depressed; snout subovoid; the nostrils somewhat elevated and forming a swollen tip; tongue subcircular, adherent and entire; vomerine odontoids forming a / ¯ ¯ \ figure behind the large choanae; eye diameter shorter than distance between eye and nostril; interorbital space concave, much broader than an upper eyelid; canthus obtusely angular; loreal sloping, concave; tympanum ⅔ the eye diameter, its posterodorsal margin slightly hidden under the skin; a dermal fold

along the forearm; an external rudiment of pollex; fingers taken in order from first to fourth exhibit the following phalanges free of web: 2 to 2¼, 1, 1 to 1¾, 1; first finger shorter than second; larger disks about ⅔ the size of the tympanum; a triangular dermal appendage at the heel; two tarsal folds, the outer extending to disk of the fifth toe; no outer metatarsal tubercle; toes fully webbed; heel of the adpressed hind limb extends to between eye and nostril. Skin above finely granular; throat smooth or slightly granular.

Color. Above, brown with darker, irregular markings; flanks with short, dark crossbars or spots. Ventral surfaces white or greenish white; thighs posteriorly, dark brown, usually with obscure darker or lighter mottlings; hind limbs, especially the anterior part of the thighs, occasionally with diffuse crossbars.

Measurements. Snout-vent ♂ 75, ♀ 105; head breadth ♂ 28, ♀ 40; head length ♂ 27, ♀ 36; femur ♂ 41.5, ♀ 59; tibia ♂ 42, ♀ 58.5.

Habits. All the U.P.R. specimens were collected at night on the trunks of trees on heavily forested areas. Of three stomachs examined, two were empty and one had three grasshoppers of the same species.

Additional Localities. Arabopó (U.M.M.Z. 85162 [4], 85163, 85164 [2], 85165); Auyantepui (A.M.N.H. 39751); Casiquiare Canal, nr. Venado (U.S.N.M. 80661-4); Cuquenam Valley (U.M.M.Z. 85167 [2]); Esmeralda (A.M.N.H. 23223); Manamo, Caño (Fowler, 1913); Paulo (U.M.M.Z. 85161); Sn. Fernando de Atabapo (U.S.N.M. 80652); Upper Orinoco (Boettger, 1896).

Range. The Venezuelan Guayana. A few specimens (U.M.M.Z. 55558-66) from the Coastal Range determined as *Hyla boans* (unfortunately not examined) may be *Hyla albopunctata.* Colombia and Trinidad to Bolivia and northern Brasil (Amazonas).

Remarks. U.S.N.M. 80652 is a large animal (125 mm.) with variegated coloration. It possibly represents some other form. *Hyla faber* and *Hyla boans* may be conspecific. Specimens of the latter with less web than usual are found in Amazonia and in the eastern base of the Andes of Colombia.

Hyla wavrini Parker

Hyla wavrini Parker, 1936, Bull. Mus. Roy. Hist. Nat. Belgique, *12*: 2: Upper Orinoco, Territorio Amazonas, Venezuela.

No material examined.

Original Description. Head depressed, as long as broad; snout rather pointed, twice as long as the diameter of the eye; nostril

more than twice as far from the eye as from the tip of the snout; tongue not emarginate and almost entirely adherent behind; vomerine odontoids in two series which together form a /¯ ¯\ between the very large choanae; interorbital space as broad as an upper eyelid; canthus obtusely rounded; loreal oblique and somewhat concave; tympanum very distinct, ⅔ the eye diameter; a supratympanic fold; fingers ⅔ webbed, the first with a projecting rudiment of pollex, much shorter than the second, which is shorter than the fourth; digital disks nearly as large as the tympanum; toes webbed to the disks; heel of the adpressed hind limb extends to the tip of the snout. Skin above, uniformly shagreened; dermal folds along the outer edges of the forearm and tarsus and a quadrangular lappet of skin on the heel. Lower surfaces granular, coarsely so on the belly and thighs, finely on the throat and chest.

Color. Pale purple brown above, with a median dark line from the snout to the middle of the back; rest of the other surfaces with a few irregular, dark scribblings. Limbs crossbarred on the exposed surfaces; their concealed surfaces with black, light centered, vertical bars. Lower surfaces uniform white. Lower eyelid with metallic venation. Bones green.

Measurements. ♀ snout-vent 75; forelimb 45; hind limb 128.

Remarks. The paratype is a male with the same data as the type; it agrees in essentials, but is slightly larger (78 mm. in snout to vent length), has a more prominent pollex, a vocal sac opening by a large slit on each side of the tongue, a brown washed gular region and almost uniform dorsal coloring.

The species is obviously allied to *Hyla faber* Wied and *Hyla pardalis* Spix, but differs from both in its longer, flatter head, shagreened dorsal surfaces and green bones (Parker, *op. cit.*).

Hyla albomarginata Spix

Hyla albomarginata Spix, 1824, Spec. Nov. Testud. Ran.: 33, pl. viii: Bahía; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 38, 43.

1 (M.C.Z. 15369) Maracaibo, v.06.

Description. Snout subovoid; tongue oval, adherent, slightly nicked behind: vomerine odontoids forming a /¯ ¯\ figure between the large, oval choanae; eye large, its diameter slightly shorter than distance between eye and nostril; interorbital space about twice as broad as an upper eyelid; canthus moderate; loreal oblique, not concave; tympanum distinct, about ½ the eye diameter; a longitudinal fold from elbow to hand; an external rudiment of pollex; first finger shorter than second;

fingers taken in order from first to fourth exhibit the following phalanges free of web: all, 2, 2½, 2; heel with a short dermal appendage; a tarsal fold; one flat, inner metatarsal tubercle, no outer; toes exhibiting the following free phalanges: 1½, 1, 1½, 2½, 1⅓; disks of the toes smaller than those of the fingers; heel of the adpressed hind limb extends to slightly beyond the tip of the snout. Skin above and on the sides of the head finely granular; a pair of dorsolateral folds from posterior corner of the eye, along the flanks, to the groins.

Color. The color of the only Venezuelan specimen available is faded and the animal presents a creamy white appearance throughout. Brasilian specimens are light brown, closely punctuated with darker brown. Noble (1918: 342) describes the living animal as green, with bluish throat, lemon yellow belly, bluish legs, yellow feet and hands, and orange web.

Measurements. ♂ snout-vent 51; head breadth 18; head length 16.5; femur 27; tibia 29.

Range. Maracaibo Basin. Central America, Colombia and British Guiana to southern Brasil. No records available from Ecuador, Bolivia and Perú.

Remarks. I do not find much difference between the Venezuelan example and specimens from Pernambuco, Brasil.

Lutz bases the inclusion of this species in the Venezuelan fauna on a specimen which he says was collected by Robinson. I have not found this species mentioned in Stejneger's report on Lyon and Robinson's collection but the specimen reported here undoubtedly belongs to *Hyla albomarginata.*

Hyla granosa Boulenger

Hyla granosa Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., ed. 2: 358, pl. xxiv, figs. 1, 2: Demerara Falls: Santarem; interior of Brasil and Canelos, Ecuador.

8 (U.P.R. 118-25) La Culebra, 1000 ft., v.50.

1 (U.P.R. 199) Anabén, Colombia, vi.50.

Description. Head depressed; snout rounded; nostrils somewhat elevated and forming a truncate tip; tongue rounded, adherent and entire; vomerine odontoids in two oblique groups between the choanae, their anterior extremities convergent; eye diameter slightly shorter than distance between eye and nostril; interorbital space about twice as broad as an upper eyelid; canthus indistinct; loreal strongly sloping, somewhat concave; tympanum not very distinct, about ½ the eye diameter; an

external rudiment of pollex; subarticular tubercles small, round, somewhat depressed; first finger shorter than second; fingers taken in order from first to fourth exhibit the following phalanges free of web: all, 1⅞ to 2, 2½, 2; a tarsal fold; one small, oval inner metatarsal tubercle; toes with the following free phalanges: 1¾ to 1⅞, 1 to 1⅓, 1 to 1¼, 1⅔ to 2, 1½; heel of the adpressed hind limb extends to the anterior corner of the eye or slightly beyond. Skin above and on the sides of the head and body minutely granular; a strong fold across the chest. Male with an external, subgular vocal sac.

Color. Above, green (yellowish white in alcohol); occasionally a distinctive light brown spot between the eyes or on the back or legs; minute brown points under a lens. Ventral surfaces white.

Measurements. ♂ Snout-vent 40; head breadth 15; head length 13; femur 19; tibia 16.5.

Habits. The species was heard in bushes along the banks of the Orinoco from a little beyond Sanariapo to the upper reaches of Río Cunucunuma. Sometimes one may walk for several miles without hearing the peculiar marimba-like call of *granosa* until attracted by it to a bush that is full of frogs. Usually the area occupied does not cover more than a few square yards. Similar conditions were observed for several other *Hyla* in South America.

Range. The Venezuelan Guayana. British Guiana and northern Brasil, ?Ecuador.

Remarks. I think it would be advisable to restrict the locality of this species but I prefer to leave the problem to someone having access to the typical material. My impression is that Boulenger's "g" specimen from Canelos may be *Hyla punctata,* which has been found in Ecuador by Peracca (1904). This, of course, is not conclusive evidence and the fact that *H. granosa* has been collected in Río Uaupés somewhat detracts from it; consequently, it is as well not to restrict the type locality until these suggestions can be verified.

Melin (1941: 21) has described a new subspecies from the Uaupés River in northern Brasil. He characterizes the new form by the different coloration (greenish yellow), absence of claw-like pollex, more slender build, less webbing and narrower limbs. Perhaps Melin ascertained from the British Museum to which of Boulenger's specimens the figure corresponds but I do not find anything in the literature in this respect. It is even possible that the figured specimen came right from the type locality of Melin's *Hyla granosa gracilis.*

Since Boulenger had preserved material, the first differential character of *H. granosa gracilis* should not be taken into consideration, while the third and last, which were based on Boulenger's figure, might be due to individual differences or to the different conditions of preservation. A small spinule is felt in the pollex of the males from Venezuela and British Guiana (specimens examined: A.M.N.H. 39734, 39985, 45752, 46234, 49260, 49262; U.S.N.M. 118053-4, all from British Guiana), and in all there is some individual variation in regard to the amount of webbing. Consequently, I have preferred to retain the binomial.

Hyla granosa resembles *Hyla punctata* but can be distinguished by its laterally situated eyes (in *punctata* they look somewhat to the front), granular skin, large disks, more sloping loreal region, smaller tympanum and more extensive webbing between the toes. This species is found in British Guiana and in all probability occurs in Venezuela.

Hyla ornatissima Noble is, I believe, a synonym. The ornate coloration of the type (*vide*) is found, though to a lesser extent, in several of the specimens of *Hyla granosa* reported here.

Hyla geographica geographica Spix

Hyla geographica Spix, 1824, Spec. Nov. Test. Ran.: 39, pl. xi, fig. 1: Teffé River, Amazonas, Brasil; Günther (part or all?), 1858, Cat. Batr. Sal. Brit. Mus.: 99.

1 (Senckenb. Mus. 2432) Iguapo, Upper Orinoco, v.1895.

Description. Head as broad as long; snout broad, subovoid; tongue oval, adherent and nicked behind; vomerine odontoids forming a / \ figure between the large choanae;; eye diameter equal to distance between eye and nostril; interorbital space broader than an upper eyelid; canthus curved, rounded but well defined; loreal oblique; tympanum ¾ the eye diameter; no distinct supratympanic fold; an outer fold between elbow and disk of fourth finger; no apparent rudiment of pollex; fingers taken in order from first to fourth show the following phalanges free of web; all, 1⅞, 2½, 2; first finger shorter than second; disks of fingers not more than ¼ the size of the tympanum; a pointed lappet at the heel; a distinct tarsal fold; no apparent metatarsal tubercles; toes exhibiting the following free phalanges: 1, 1, 1½, 2½, 1; disks of the toes smaller than those of the fingers; hind limbs slender; heel of the adpressed hind limb extends to the middle of the snout. Skin above, shagreened.

Color. Above, light brown, with an irregular, darker marking that starts behind the eyes with two horns which unite and broaden posteriorly into a more extensive spot; a dark vertebral line from tip of the snout to scapular region; a not too distinct spot behind the sacrum; flanks with dark transverse striations; thighs with narrow transverse bands and reticulations; anterior and posterior aspect of thighs darker than dorsolateral portions; rest of the limbs crossbarred with alternating broad and narrow stripes. Below, brownish.

Measurements. ♂ ? snout-vent 40; head length 15; head breadth 15; femur 21; tibia 21.

Additional Localities. Venezuela (Günther, 1858); ?Iguapo (Senckenb. Mus. 2590 = Boettger, 1896, *H. punctatissima*).

Range. Venezuelan Guayana. According to Parker (1935): Cis-Andean Ecuador and Perú, Amazonas, Pará, Guianas and Trinidad.

Remarks. Parker (1935) does not mention the differences between *Hyla g. geographica* and *H. g. punctatissima* and Boulenger (1882) had both races in his *H. appendiculata.*

For comparison with the only specimen from the north, I had material from Sta. Catharina, Brasil, Robore and Buena Vista, Bolivia. The Brasilian animals seem to have a straighter canthus and a little more web in the fingers. The snout is longer (eye diameter shorter than distance between eye and nostril) and in most of the larger specimens, broader. Instead of the transverse vermiculations of the flanks, the Sta. Catharina animals have profuse dark dotting, and except for some ill-defined transverse bars on the posterior part of the dorsum of some specimens, or occasional black spots, there is no other dorsal pattern. The thigh bars are closer together and do not surround white areas or spots, and transverse limb bars are not present in several specimens.

The Bolivian specimens show a pattern similar to the Venezuelan example but the large spots are more abundant and there is sometimes profuse dotting of the dorsal surfaces. The limb bars are usually very well defined but the flanks sometimes show white, black-margined spots instead of bars or dark spotting. In M.C.Z. 12869 and 29849 the venter is covered with brown, equidistant and irregularly-shaped spots. The canthus in these specimens is not well defined and the eyes do not seem to be as large or protuberant as in either Brasilian or Venezuelan examples. They are as different from the northern as from the southern

Brasilian animals and further studies will probably indicate them to be racially distinct.

The juvenile form of *H. crepitans* is probably punctate above, as is that of *H. geographica*.

Hyla crepitans Wied

Hyla crepitans Wied, 1824, Abbild. Naturg. Bras.: (4) *5*, pl. v, fig. 1: Bahía; Peters, 1877, Monatsb. Akad. Wissensch. Berlin: 460; Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., ed. 2: 352; Boettger, 1892, Kat. Batr. Samm. Mus. Senckenb.: 40; 1893, Ber. Senckenb. Naturf. Ges.: 40; 1896, Ber. Senckenb. Naturf. Ges.: LIV; Stejneger, 1902, Proc. U.S. Nat. Mus., *24*: 181; Boulenger, 1903, Ann. Mag. Nat. Hist., (7) *11*: 481; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 38, 43, pl. xv, figs. 35, 35a, 36, 36a, 36b; Parker, 1936, Bull. Mus. Roy. Hist. Nat. Belgique, *12*: 2; Schmidt, K. P., 1932, Zool. Ser. Field Mus. Nat. Hist., *18*: 160; Shreve, 1947, Bull. Mus. Comp. Zool., *99*: 536; Röhl, E., 1949, Fauna Descr. de Ven., ed. 2: 400, fig. 180; Alemán, 1952, Mem. Soc. Cienc. Nat. La Salle, *12*: 27.

Hyla pardalis Günther (part or all?), 1858, Cat. Batr. Sal. Brit. Mus.: 99.

6 (M.C.Z. 25978-83) Paují.

1 (M.C.Z. 26142) Riecito.

Description. Head broader than long; snout broad-subovoid; tongue oval or subcircular, adherent, entire or emarginate behind; vomerine odontoids forming a /‾ ‾\ figure between the large, oval choanae; eye diameter equal or slightly shorter than distance between eye and nostril; interorbital space more or less equal to an upper eyelid; canthus rounded; loreal moderately oblique, not concave in fresh specimens; tympanum ¾ the eye diameter; a supratympanic fold; an outer, sometimes indistinct, fold from elbow to disk of fourth finger; an external rudiment of pollex; fingers taken in order from first to fourth exhibit the following phalanges free of web: all, 1⅞ to 2, 2 to 2½, 2⅓ to 2½; first finger shorter than second; disks of the fingers not more than ½ the size of the tympanum; a slight tarsal fold; outer metatarsal tubercle absent; toes exhibiting the following free phalanges: 1 to 1½, 1 to 1¼, 1¼ to 1½, 2½ to 2⅔, 1 to 1¼; disks of the toes smaller than those of the fingers; heel of the adpressed hind limb extends to the tip of the snout or slightly beyond. Skin above, smooth. Male with a subgular vocal sac.

Color. Above, light brown or creamy, generally with a large, central, diffuse spot; flanks lighter, with narrow transverse lines on the posterior half; thighs with narrow transverse bars that sometimes broaden and become more diffuse above; tibial segment

uniform or with irregular, diffuse spots. Below, yellowish gray or white, the throat usually speckled with dark.

The color of the living animal was described by Kugler (Shreve, 1947): "Above white, almost silver white, with large black eyes, whose grayish eyelids have a fine black ring around the base; finger tips and belly light yellow. One pair taken in embrace had brownish markings on a yellow ground, another mating pair exhibited brown marblings exactly the shade of the soil."

Measurements. Snout-vent ♂ 62, ♀ 65; head breadth ♂ 22, ♀ 22; head length ♂ 20.5, ♀ 21; femur ♂ 33, ♀ 31; tibia ♂ 33, ♀ 33.

Habits. Of three stomachs examined two were empty and one contained a cricket and a beetle.

In the M.C.Z. Paují group (iv-xi.44), one female is full of eggs.

Additional Localities. Albarregas, Río (A.M.N.H. 10521-4); Arabopó (U.M.M.Z. 85192-4, 85196[2]); Baruta (Alemán, 1952); Bejuma (U.M.M.Z. 55564); Boca de Río (U.S.N.M. 128790); Calabozo (Peters, 1877); Caracas (U.S.N.M. 55329-30, 120091, 129264; U.C.V. 821; Günther, 1858; Boettger, 1882); Caicara (A.M.N.H. 16907-10; U.S.N.M. 36376); Caserío Silva (U.M.M.Z. 55565); Chama (A.M.N.H. 10632-3); Cuquenán Valley (U.M.M.Z. 85189[2]); El Limón (U.S.N.M. 12159-61); El Periquito (U.C.V. 91-5); El Valle (C.N.H.M. 26188; U.S.N.M. 128791); Espino (U.C.V. 53, 521); Güiria, Península de Paria (M.C.Z. 23024-8); Kunana, Perijá Mts. (Alemán, 1953); La Cruz Pruviera (U.S.N.M. 72757-8); La Guaira (U.S.N.M. 22543-4 [= Stejneger, 1902]; Los Canales (U.S.N.M. 128787-9); Maeuto (U.C.V. 79); Maracay (Lutz, 1927); Mérida (M.C.Z. 2525; C.N.H.M. 3569-70; Boulenger, 1903); Ocumare del Tuy (U.C.V. 49); Palma Sola (U.M.M.Z. 55563); Parmana (U.C.V. 50); Paulo (A.M.N.H. 39756); Petare (U.S.N.M. 121162); Pie del Cerro (U.S.N.M. 121154-7); Puerto Cabello (Boettger, 1893); Sn. Esteban (U.M.M.Z. 55558-62); Sn. Juan de los Morros (U.S.N.M. 72756); Sierra Maestra, 1,260 m. (U.S.N.M. 129575); Sosa (U.C.V. 87); Sta. Lueía (U.S.N.M. 121152-3); Turgua (Alemán, 1952); Upper Orinoco (Boettger, 1896; Parker, 1936); Urama (C.N.H.M. 26185, 29184-5); Yumarito (U.M.M.Z. 55566); Venezuela (C.N.H.M. 28115-6; Günther, 1858); Zaraza (U.C.V. 30).

Range. Probably all the physiographical provinces of Venezuela including the Andes to 1,600 m., Central America, Colom-

bia, Trinidad and the Guianas to southern Brasil. No records available from Ecuador, Bolivia, and Perú.

Remarks. I do not find much geographic variation in this species from Panama to Minas Gerais, although there is much individual variation everywhere. A dark vertebral line is occasionally present in specimens from any locality and the throat is profusely infuscated in fresh males. In specimens from the Magdalena Valley, Colombia (M.C.Z. 21475-83), the head is narrower than usual and there is fine granulation on the anterior third of the body. In M.C.Z. 2204 from Trinidad the snout is very broad and flat while M.C.Z. 26655 from Sao Paulo, Brasil, has dark dots over the dorsal surface. Apparently this last animal is not identical with *H. crepitans*. The specimens from La Cruz Pruviera reported here show broad bars that bifurcate on the posterior part of the thighs.

Specimens from Casa de Julián (U.P.R. 130-1) are provisionally included here although I have little doubt that they belong to some other form. The tympanum is about the same size as the eye (as it is in some *H. crepitans*), the heel extends to between eye and nostril and the color alive was distinctly different from that described by Kugler and others for the living *H. crepitans*. The dorsum in both specimens was dark green, the flanks light green, transversely striped with brown; loins blue; ventral surface of the limbs greenish blue and the throat yellow. Both specimens were collected at night upon being guided by their short, sporadic "crah crah." One of them was on the ground near a shallow stream; the other was sitting on the leaf of a Taro plant. These specimens agree in almost all structural characters with *H. crepitans* but their size is considerably smaller (the larger 46.5 mm.) than any adult males of *crepitans* observed and even the color in preservation is different. The type of *Hyla indris* Cope which is supposed to be very similar to *crepitans* has not been found.

Several specimens from Venezuela and British Guiana that were determined as *Hyla pardalis* in various museums have proven to be *Hyla crepitans*.

Hyla albopunctata multifasciata Günther

Hyla multifasciata Günther, 1858, Cat. Batr. Sal. Brit. Mus.: 101, 146, pl. viii, fig. D: Pará.

?Hyla rostrata Peters, 1863, Monatsb. Akad. Wissensch. Berlin: 466.

2 (U.M.M.Z. 85178) Arabopó.

2 (U.M.M.Z. 85179) Arabopó.
1 (U.M.M.Z. 85180) Cuquenam Valley.

Description. Snout long, subelliptical; tongue narrow, oval, adherent, entire or emarginate behind; vomerine odontoids in a /‾ ‾\ series between the large, oval choanae; eye diameter shorter than distance between eye and nostril; interorbital space broader than an upper eyelid; canthus distinct; loreal almost straight, concave; tympanum about ¾ the eye diameter; a supratympanic fold from posterior corner of the eye to above the shoulder or farther back along the flank; a longitudinal fold along the forearm; a not very prominent rudiment of pollex; subarticular tubercles very prominent; first finger shorter than second, practically free; others with a short basal web; disks narrow, much smaller than the tympanum; hind limbs very long and slender; a slight tarsal fold; toes taken in order from first to fifth exhibit the following phalanges free of web: 1⅔, 1, 1½, 2½ to 3, 1 to 1¼; heel of the adpressed hind limb extends to the tip of the snout or beyond. Skin above smooth; a fold across the chest. Male with a subgular, external vocal sac.

Color. Above, brown, usually with light-margined, transverse bands and a dark vertebral line; apparently a canthal streak; a transverse light glandular ridge line above the anus; limbs generally crossbarred; flanks and posterior part of the thighs uniformly brown. Below, light brownish.

Measurements. Snout-vent ♂ 47, ♀ 49; head breadth ♂ 13.5, ♀ 14; head length ♂ 15.2, ♀ 17; femur ♂ 24, ♀ 27; tibia ♂ 26, ♀ 31.

Range. The eastern Venezuelan Guayana. The species extends from British Guiana to southern Brasil. The race appears to stop in the vicinity of latitudes 5° and 10°.

Remarks. As far back as 1900 Andersson pointed out that *Hyla maxima* Laurenti was a synonym of *Rana boans* Linné and that *Hyla boans* Daudin should receive another name, for which he proposed *Hyla albopunctata* Spix. Apparently overlooking this, Ahl (1939: 318) suggested that the name *Hyla boans* Daudin be changed to *Hyla albopunctata*, due to preoccupation by *Calamita boans* Schneider, 1799 (= *Hyla tibiatrix* Laurenti, 1768). This is not the case, however, and in 1940, Mertens (p. 195) reemphasized that *boans* is only applicable to *Hyla maxima* Laurenti and not to *Hyla tibiatrix* Laurenti. Confusion still persists in some museums where the two very different species *Hyla albopunctata* Spix and *Hyla boans* (Linné) are included under the same name.

Besides the 5 Venezuelan specimens, I have examined 36 from British Guiana (A.M.N.H., U.M.M.Z.) and 4 from Paraguay and Brasil (M.C.Z.). The northern and southern animals show a decided difference in the coloration of the dorsum, flanks and limbs. In the Brasil-Paraguay group, both the flanks and the posterior part of the thighs are spotted with white (as described by Spix) and the dorsum is not crossbanded (except in one case, where the bands are somewhat diffuse and the design quite different from the condition found in the northern animals). The 5 Venezuelan frogs (one indistinctly) and most of those from British Guiana are banded above and the flanks and hinder part of the thighs of all of them are of a plain brown color. It is interesting to note that Daudin, most of whose specimens were apparently from Surinam, and Boulenger, who also had the greater number of specimens from the north, do not describe any white spots on the flanks and limbs. Duméril and Bibron (1841) make no mention of the white spots and they had animals from "Surinam, Cayenne et du Brésil." Cochran (personal communication) and Ruthven (1919) have also spoken of the uniform coloration of the posterior part of the thighs and flanks in specimens from British Guiana.

The frog from Río Bermejo named *Hypsiboas raniceps* by Cope (1862) was thought later to be identical (Cope, 1863) with Reinhardt and Luetken's *Hyla oxyrhina* described as having white spots. Dr. Cochran, however, tells me (letter, 16.10.51) that these two species should be kept distinct. In a recent paper (1955: 80) she puts *H. oxyrhina* in the synonymy of *H. albopunctata* and *H. spegazzini* in the synonymy of *H. raniceps*. *Hyla multifasciata* Günther, 1858, and *Hyla boans* Bauman, 1912, refer to specimens from Pará, none of which had the white spots. Parker (1935) does not say anything of his British Guiana specimens but (1928) describes the white spots in animals from Brasil.

Shreve (1935: 211) pointed out the difference between *Hyla boans* Daudin and *Hyla albopunctata* Spix but the specimen of "*boans*" he had was *Hyla raniceps* (erroneously det. as *boans* in M.C.Z.) from Pernambuco. This apparently led him to conclude that *H. raniceps* (*spegazzini* auct.) could be a southern representative of *H. boans*.

As the present distribution and the morphological characters of the species only suggest subspecific differentiation between the northern and the southern form, the name *Hyla albopunctata multifasciata* is suggested for the animal occurring north of the Amazon.

Although I have examined considerable material from the Coastal Range of Venezuela, no specimen from that region agrees with Peter's description of *Hyla rostrata*. *Hyla albopunctata multifasciata* agrees in many important details with this description and in all probability, *rostrata* is a synonym of this species.

HYLA LOVERIDGEI sp. n.

Figure 8

Type. Museum of Comparative Zoology No. 28565, a ♂ from Pico Culebra, Mt. Duida, 3000 ft., Territorio Amazonas. Coll. J. A. Rivero, 4 May 1950.

Fig. 8. *Hyla loveridgei* sp. n. Type M.C.Z. 28565.

Diagnosis. A medium sized *Hyla* with broad, adherent tongue; tympanum ½ the eye diameter; outer finger with three free phalanges; a blunt pollex; disks of the fingers larger than the tympanum; disks of the toes much smaller than those of the fingers; heel extending to between eye and nostril and marbled coloration above.

Description. Snout rounded; tongue very broad, adherent and nicked behind; vomerine odontoids forming a /‾ ‾\ figure between the large, oval choanae; eye diameter very slightly greater than distance between eye and nostril; interorbital space more or less equal to an upper eyelid; canthus moderate; loreal slightly oblique, concave; tympanum ½ the eye diameter, its dorsal margin covered by a supratympanic fold that runs to the shoulder; a row of closely set tubercles along the forearm; a blunt, external rudiment of pollex; first finger shorter than second; subarticular tubercles moderate; disks large, the largest larger than the tympanum; outer three fingers with a rudiment of web; a very distinct transverse fold at the heel; a slight tarsal fold; two metatarsal tubercles, the outer small, round and indistinct; toes taken in order from first to fifth exhibit the following phalanges free of web: 2, 1½, 1½, 3, 1⅔; disks of the toes much smaller than those of the fingers; heel of the adpressed hind limb extends to between eye and nostril. Skin above, smooth. Male with a brown rugosity on the pollex and inner finger but no apparent external vocal sac.

Color. Above, reddish brown marbled with black; flanks with numerous small whitish spots; limbs crossbarred. Below, immaculate.

Measurements. ♂ Snout-vent 42; head breadth 15; head length 14.5; femur 20; tibia 22.

Habits. The only specimen was taken at about 3 P.M. as it sprang from beneath (or near?) a rock in a treeless, rocky area of Mt. Duida.

Remarks. Like *Hyla callipleura*, this species has white spots on the flanks but these are small and less distinct than in the Bolivian animal which also has a completely different coloration above, less webbed fingers, and different vomerine teeth.

Hyla raniceps (Cope)

Hypsiboas raniceps Cope, 1862, Proc. Acad. Nat. Sci. Phila., *14*: 353: Río Vermejo, Paraguay.

1 (A.M.N.H. 13055) Cucuhy R.

Description. Snout subovoid; tongue broad, cordiform, slightly free and nicked behind; vomerine odontoids forming a /‾ ‾\ figure between the moderate choanae; eye diameter equal to distance between eye and nostril; interorbital space more or less equal to an upper eyelid; canthus well defined, curved; loreal almost vertical, slightly concave; tympanum oblique, ⅔ the eye

diameter; a dorsolateral fold from posterior corner of the eye to behind the shoulder; no external rudiment of pollex; a slight fold along the forearm; one elongated but flat and indistinct inner metacarpal tubercle; fingers with a short basal web (all, 2, 2⅞, 2¾); disks small, the largest about ⅓ the size of the tympanum; a slight tarsal fold; a triangular dermal appendage at the heel; a small, oval, inner, and a minute, rounded, outer metatarsal tubercle; toes fully webbed with the exception of the fourth, where two phalanges are left free; heel of the adpressed hind limb extends to between eye and nostril. Skin above, very finely granular.

Color. Above, brown, with distinctive darker vermiculations; loreal region darker than the rest of the head; a dark supratympanic streak continues with the fold for about ⅓ of the length of the flank; posterior part of the thighs yellowish brown with broad, dark brown crossbars that become diffuse and less distinct above and then darker again on the anteroventral portion; rest of the hind limbs with diffuse spots that sometimes form crossbars; ventral surfaces yellowish brown.

Measurements. ♀ Snout-vent 70; head breadth 23; head length 21; femur 34.5; tibia 38.

Habits. Collected on ground in open grass during the day.

Range. Only known from this specimen in Venezuela. Pará and S. Venezuela to Chaco Argentino.

Remarks. Comparison of this specimen with seven examples from Paraguay (M.C.Z. 24811-6, Dept. Villeta) reveals these last to be smaller (larger, 63 mm.), having a more pointed snout, occasionally a vertebral stripe and always a longer hind limb, the heel of the adpressed hind limb extending to the nostril or tip of the snout. Some males in this group have moderate, subgulopectoral vocal sacs.

Cochran (1955:96) has discovered that *Hyla spegazzini* Boulenger is a synonym of *Hyla raniceps* (Cope).

Hyla taurina (Steindachner)

Ostcocephalus taurinus Steindachner, 1862, Archiv. per. la Zool., *2*: 77, pl. vi, figs. 1-3: Río Negro, Brasil; Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., ed. 2: 363.

Hyla taurina Boettger, 1896, Ber. Senckenb. Naturf. Ges.: LIV.

1 (U.P.R. 113) Tapara, v.50.

2 (U.P.R. 114-5) Mt. Marahuaca, v.50.

1 (U.P.R. 116) La Culebra, 1000 ft., vi.50.

1 (U.P.R. 117) Pto. Ayacucho, vi.50.

Description. Head depressed; skull rugose; snout rounded in the female, less so in the male; tongue adherent, subcircular or broadly oval, entire and slightly free behind; vomerine odontoids in a /‾ ‾\figure between the oval, oblique choanae; eye diameter about ¾ the distance between the eye and nostril; interorbital space much broader than an upper eyelid, with two bony ridges of varied prominency that extend back to the occipital region; canthus strong; loreal concave, sloping in the female, almost straight in the male; tympanum distinct, almost as large as the eye; a distinct supratympanic fold; no distinct rudiment of pollex; subarticular tubercle of the outer finger double; first finger shorter than second; taken in order from first to fourth, the fingers exhibit the following phalanges free of web: all, 1¾, 2⅔ to 2¾, 2½ to 2⅔; larger disks almost as large as the tympanum; a small, round, outer and a prominent, inner metatarsal tubercle; fourth toe leaving from 2 to 2½ free phalanges, others completely webbed; disks of the toes smaller than those of the fingers; heel of the adpressed hind limb extends to the nostril. Skin above, with small, flat tubercles in the female, distinctly tubercular in the male. Male with a pair of black vocal pouches behind the angle of the jaw and a brown rugosity in the inner side of the first digit.

Color. Above, brown with irregular and generally obscure darker blotches; flanks occasionally spotted with white; limbs crossbarred, the hind part of the thighs uniformly brown. Lower surfaces grayish white, generally reticulated with brown.

Measurements. Snout-vent ♂ 73, ♀ 86; head breadth ♂ 24, ♀ 28; head length ♂ 24, ♀ 26.5; femur ♂ 36, ♀ 41; tibia ♂ 37.5, ♀ 44.

Habits. All specimens were taken at night on the lower branches of trees or palm fronds, usually near water. The voice is a deep croak similar to that of *Hyla boans.* U.P.R. 117 was full of eggs.

Additional Localities. Caracas (Boulenger, 1882); Esmeralda (A.M.N.H. 23174); Pescado, Caño (A.M.N.H. 27777); Yapacana (U.S.N.M. 83947); Upper Orinoco (Boettger, 1896).

Range. The Venezuelan Guayana. British Guiana, Ecuador, Bolivia, N. Brasil and probably southeastern Colombia.

Remarks. The male of this species is quite different from the female (snout less broad, cranial ridges less prominent, dorsum distinctly tubercular), and rather similar to some males of *Hyla*

tibiatrix, from which it can be immediately distinguished by the position of the vomerine teeth.

See remarks under *Hyla tibiatrix.*

Hyla paramica sp. n.

Type. Museum of Zoology University of Michigan No. 59016, a ♂ from Escorial, Venezuela.

Diagnosis. A small *Hyla* with an almost semicircular snout; long, almost transverse vomerine teeth situated immediately behind the choanae; adherent tongue; small, indistinct tympanum; outer finger with 2¼ free phalanges; heel extending to the eye and smooth dorsal surfaces.

Description. Snout short, almost semicircular; tongue broad, entire and adherent; vomerine odontoids in two long, scarcely oblique, almost continuous groups, slightly behind the moderate choanae, their converging anterior extremities extending to the level of the inner margin of the latter; eye diameter equal to distance between eye and nostril; interorbital space about 1½ times broader than an upper eyelid; canthus rounded, much curved; loreal slightly oblique, not concave; tympanum small and indistinct, not quite ½ the eye diameter; a blunt rudiment of pollex; one oval, inner metacarpal tubercle; subarticular tubercles small; first finger shorter than second; fingers taken in order from first to fourth exhibit the following phalanges free of web: all, 2, 2½, 2¼; disks small, the largest slightly smaller than the tympanum; no tarsal fold; inner metatarsal tubercle very indistinct, outer absent; toes exhibiting the following free phalanges: 2, 1½, 1⅞, 3, 1½; heel of the adpressed hind limb extends to anterior corner of the eye. Skin above, smooth.

Color. Above, yellowish white with scattered, small melanophores; anterior and posterior part of the thighs with a slight reddish tinge. Below, yellowish.

Measurements. ♂ Snout-vent 31; head breadth 11.5; head length 10; femur 14.5; tibia 15.5.

Remarks. The following specimens are designated as paratypes:

C.N.H.M. 3567, a ♀ from Escorial. Snout-vent 32; head breadth 16; head length 11; femur 15; tibia 16.5. Tympanum slightly less distinct than in the type and pollex considerably more prominent but always blunt and unhooked.

C.N.H.M. 3568, a ♀ from Escorial. Snout-vent 34; head breadth 12; head length 10.5; femur 17; tibia 17.5. Pollex more prominent than in the type; a definite orange tinge on the

sides of the head, throat, chest and underside of the hind limbs.

A.M.N.H. 10636, ♂, La Culata, 3000 m. Snout-vent 35; head breadth 11.5; head length 11; femur 15.5; tibia 16.5. A rounded pollex and a slight external vocal sac; throat, loins and thighs below, orange drab.

A.M.N.H. 10639, ♀, La. Culata, 3000 m. Snout-vent 28; head breadth 11; head length 10; femur 14; tibia 14.5. Orange drab on the dorsum, back of the head and on the belly.

This species is somewhat similar to *H. jahni* from which it can be distinguished by the rounded snout, less defined canthus, lack of supratympanic fold and absence of canthal, palpebral and supratympanic lines.

Hyla jahni sp. n.

Type. Museum of Zoology University of Michigan No. 46465, a ♂ from Escorial, Venezuela.

Diagnosis. A small *Hyla* with subovoid snout; adherent tongue; slightly oblique vomerine teeth behind the choanae; hidden or indistinct tympanum; flat fingers and toes; outer finger with 2½ free phalanges; heel extending to the anterior corner of the eye; punctuated dorsal surfaces and light line along the canthus and supratympanic fold.

Description. Snout subovoid; tongue circular, adherent and very slightly nicked behind; vomerine odontoids in two slightly oblique groups behind the choanae, their converging anterior extremities extending to the horizontal of the inner margin of the latter; eye diameter more or less equal to distance between eye and nostril; interorbital space about twice as broad as an upper eyelid; canthus distinct, curved; loreal almost vertical, not concave; tympanum hidden; a very distinctive fold from posterior corner of the eye to slightly behind the axilla; no distinct external rudiment of pollex; a prominent oval, inner metacarpal tubercle; first finger shorter than second; fingers and toes flattened; taken in order from first to fourth, the fingers exhibit the following phalanges free of web: all, 2, 2½, 2½; subarticular tubercles small; one flat and indistinct inner metatarsal tubercle but no outer; toes exhibiting the following free phalanges: 1⅞, 1½, 1⅔, 2¾, 1; heel of the adpressed hind limb extends to anterior corner of the eye. Skin above, smooth.

Color. Above, brown, closely punctuated with darker brown; canthus, margin of upper eyelid, and probably the supratympanic fold with a light line; anterior and posterior part of the thighs plain brownish.

Measurements. ♂ Snout-vent 34.5; head breadth 11.5; head length 11; femur 15.5; tibia 16.5.

Remarks. The following specimens have been designated as paratypes:

U.M.M.Z. 59016, a ♀ from Escorial. Snout-vent 29; head breadth 11; head length 9.5; femur 15; tibia 16. Tongue entire; vomerine teeth juxtaposed; tympanum present but indistinct, not quite ½ the eye diameter; disks larger than the tympanum; toes exhibiting the following phalanges free of web: 1¾, 1¼, 1½, 2¾, 1½; heel extending to between eye and nostril; color uniform yellowish above and below.

U.M.M.Z. 46465, a ♀ from Escorial. Snout-vent 25; head breadth 8.5; head length 8; femur 12.5; tibia 12.5. Tympanum hidden or almost so; color above whitish with dark points that are scattered and less distinct than in the type. Canthal line distinct.

M.C.Z. 2523, a ♂ from Mérida. Snout-vent 24.5; head breadth 11.5; head length 7.5; femur 12; tibia 12. Tympanum indistinct; color above and below whitish; white supratympanic line present.

A.M.N.H. 10637, a ♀ from La Culata, 3,000 m. Snout-vent 26; head breadth 8; head length 7.5; femur 12.5; tibia 13. Tympanum hidden; fingers appear to be shorter relatively than in the type; punctuation above, white instead of dark; canthal, palpebral and supraorbital lines distinct; ground color above and below, yellowish white.

A.M.N.H. 10638, a ♂ from La Culata, 3,000 m. Snout-vent 31.5; head breadth 11; head length 10.5; femur 14.5; tibia 16. Tympanum very indistinct, almost hidden; rudiment of pollex more distinct than in the type and other specimens; supratympanic fold extending for some distance along the flank; canthal, palpebral and supratympanic lines distinct; ground color above yellowish, with white punctuation; hind limbs below, with an orange drab.

A.M.N.H. 10640, a ♂ from La Culata, 3,000 m. Snout-vent 31.5; head breadth 11; head length 10.5; femur 15; tibia 16. Tympanum almost hidden; ground color brownish; canthal, palpebral and supratympanic lines golden; color above and below brownish with dark punctuation above.

The dark punctuation of the dorsal surface may become light or even disappear on preservation. When present, this species looks somewhat like *Hyla albomarginata* but can be distinguished from that form by its smaller size and many other characters.

Hyla jahni appears to be restricted to the high elevations of the Andes where *Hyla albomarginata* does not exist.

Specimens of *Hyla jahni* have been also confused with *Hyla punctata* but although this form, or a race of it, may be found in Venezuela, it is unlikely to be in the Andes as high as 2,000 m. *Hyla punctata* has large, well defined tympana that are about ⅔ the eye diameter, the eyes are partially directed forwards and the small spots above are scattered and always white in preservation.

Hyla paramica differs from *Hyla jahni* in its rounded snout, less defined canthus and in lacking supratympanic fold, canthal, palpebral and supratympanic lines and closely set dark dots above.

The species is named after Dr. Alfredo Jahn, great student of the Venezuelan Páramos.

Hyla platydactyla Boulenger

Hyla platydactyla Boulenger, 1905, Ann. Mag. Nat. Hist., (7) *16*: 183: Mérida, Andes of Venezuela; Lutz, A., Mem. Inst. Osw. Cruz, *20*: 39, 44.

No material examined.

Original Description. Head moderate, much depressed, a little broader than long; snout rounded, hardly as long as the orbit; nostrils near the tip of the snout; tongue subcircular, entire, slightly free behind; vomerine odontoids just behind the level of the moderately large choanae, in two slightly oblique series converging forwards; interorbital region a little broader than an upper eyelid; canthus rostralis distinct; loreal region very oblique, concave; tympanum rather indistinct, ⅓ the eye diameter; fingers much flattened, with a short basal web which extends as a fringe to the disks; toes short, much flattened, with a deeply notched web extending to the disks; latter about ½ the eye diameter; subarticular tubercles feeble; no tarsal fold; heel of the adpressed hind limb extends to the eye. Skin above, smooth. Below, belly and thighs granular. Male with a feebly developed, subgular vocal sac.

Color. Above, purplish, closely dotted with darker; upper surfaces of the arms and thighs white, with a median stripe of closely set, dark purple dots. Below, white.

Measurements. Snout-vent 32.

Remarks. This species seems to be very distinctively colored. It appears to be of a uniform light color, densely mottled with darker; between mottlings, the light ground color can be seen

especially on the flanks and limbs. On the hand and foot, the dark color is limited to the outer digits, giving the impression of the situation in *Phyllomedusa*.

Hyla platydactyla is of approximately the same size as *Hyla jahni* and *Hyla paramica* and occurs in the same general area as these two species. It differs from *Hyla jahni* in the shorter snout and less defined canthus, absence of a light canthal and supratympanic line, narrower interorbital space, more vertical loreal region and different coloration. From *Hyla paramica* it can be differentiated by its longer snout, more oblique loreal region, absence of a pollex rudiment (not described or shown in photograph) and different coloration. It is also said to be allied to *Hyla vilsoniana* Cope (Boulenger, 1905).

I owe to Mr. J. C. Battersby the comparison of a photograph of *Hyla jahni* with the type of *Hyla platydactyla* and to Miss A. G. C. Grandison the photographs of the type specimen shown here. All remarks are based on this photograph and on the description of the species.

Hyla benitezi sp. n.

Figure 9

Type. Museum of Comparative Zoology No. 28564, a ♂ from Caño Wanadi, Mt. Marahuaca, Territorio Amazonas. Coll. J. A. Rivero, 20 May 1950.

Diagnosis. A medium sized *Hyla* with adherent tongue, vomerine teeth forming a / \ figure between the choanae; tympanum small, indistinct; an external rudiment of pollex; outer finger with 2⅔ free phalanges; largest disks larger than the tympanum and orange ventral coloration in life.

Description. Snout subovoid; tongue circular, adherent and nicked behind; vomerine odontoids forming a / \ figure between the moderate, oval, choanae, their anterior extremities extending to about the middle of the oblique inner margin of the latter; eye diameter more or less equal to distance between eye and nostril; interorbital space slightly broader than an upper eyelid; canthus indistinct; loreal sloping, slightly concave; tympanum very small and indistinct, ⅓ the eye diameter; an external rudiment of pollex; first finger shorter than second; outer three fingers with a short basal web; disks moderate but larger than the tympanum; subarticular tubercles small,

rounded; an elongated, flat and indistinct inner metatarsal tubercle but no outer; toes fully webbed with the exception of the fourth where about two phalanges are left free; disks of the toes smaller than those of the fingers; heel of the adpressed hind limb extends to the middle of the eye. Skin above, smooth; below, finely granular. Male with a slight subgular vocal sac.

Color. Above and on the limbs brown, with darker brown transverse bars of varying width. Ventral surfaces including the limbs bright orange (in life) or white (alcohol after formalin). The inner fingers and toes and the webs were also orange above.

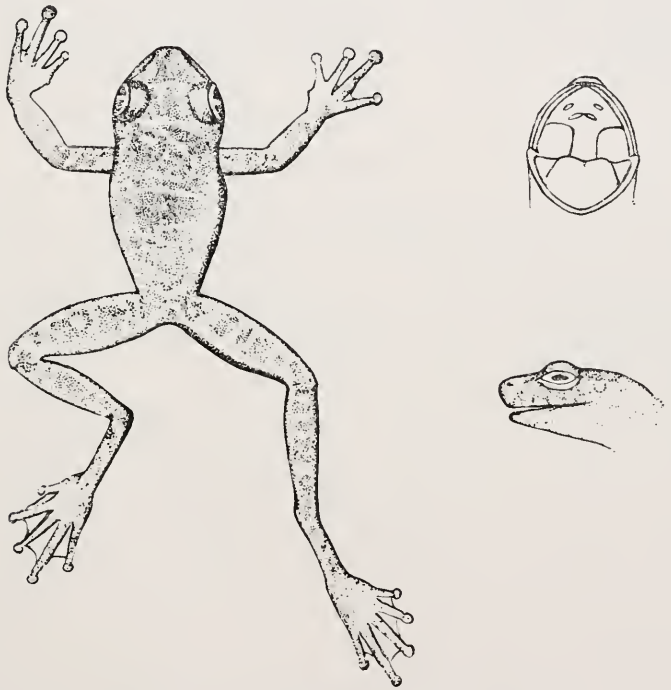

Fig. 9. *Hyla benitezi* sp. n. Type M.C.Z. 28564.

Measurements. ♂ Snout-vent 37; head breadth 13.5; head length 12; femur 16; tibia 18.5.

Habits. Both type and paratype were collected on the leaves of a dwarf palm that thrives on the stones of mountain stream rapids. The voice is heard sporadically at night but due to the

uproar of the water, their localization is very difficult and their collection in the inaccessible places from which they call generally impossible.

Remarks. This form is quite different from anything known in Venezuela or from material of northern South America available to the author for comparison.

Morphologically, the only paratype is almost identical with the type but differs from it in coloration.

U.P.R. 145, a ♂ from Caño Wanadi, Mt. Marahuaca. Coll. J. A. Rivero, May, 1950. Snout-vent 36; head breadth 13.5; head length 12.5; femur 16; tibia 19. Color above, grayish brown with very obscure, slightly darker spots on the body and reticulations on the head. The tympanum is probably less distinct than in the type and the openings of the Eustachian tubes smaller.

Hyla marahuaquensis sp. n.

Figure 10

Type. Museum of Comparative Zoology No. 28566, a ♂ (?) from Caño Cajú, Mt. Marahuaca, Territorio Amazonas. Coll. J. A. Rivero, May 1950.

Diagnosis. A small *Hyla* with physiognomy of *Eleutherodactylus;* transverse vomerine teeth between the choanae; fingers webbed; first finger longer than second; heel extending to the nostril; very peculiar dorsal coloration.

Description. Snout rounded; tongue oval, slightly free and nicked behind; vomerine odontoids in two juxtaposed, transverse groups between the moderate, oval choanae; eye diameter equal to distance between eye and nostril; interorbital space slightly convex, as broad as an upper eyelid; canthus moderate; loreal moderately oblique, concave; tympanum large, ½ the eye diameter; an indistinct supratympanic fold from lower eyelid to shoulder; fingers long and slender, free, the first longer than the second but shorter than fourth; two small metacarpal tubercles; subarticular tubercles well defined, rounded; largest disks about ½ the size of the tympanum; a small inner metatarsal tubercle but no outer; toes taken in order from first to fifth exhibit the following phalanges free of web: 2, 2, 2, 3⅔, 2¼; hind limbs long and slender; heel of the adpressed hind limb extends to the nostril. Skin above smooth; granular on the loreal and temporal regions; rugose on the upper eyelids. Ventral surfaces of the body and thighs finely granular.

Color. Above, brown, this color bounded by a pair of dorsolateral lines that cross the black upper eyelids and meet in a posteriorly directed notch in the interorbital space; snout lighter than the dorsal color enclosed by the dorsolateral lines; a small black spot behind the nostril; upper lip with light vertical bars; three dark spots on the dorsum in front of the sacrum, one in the middle of the back and one on each side just below the dorsolateral line; behind these, other more diffuse spots occur in succession; limbs yellowish brown streaked with darker brown; flanks of the same color as the limbs but uniform below the already described spots. Ventral surfaces dirty white.

Fig. 10. *Hyla marahuaquensis* sp. n. Type M.C.Z. 28566.

Measurements. ♂ ? Snout-vent 27; head breadth 10; head length 10.5; femur 14; tibia 15.9.

Remarks. This specimen was thought to be an *Eleutherodactylus* until its true affinities were revealed by the position of its vomerine teeth, the expanded sacral diapophysis, the presence of claw-shaped terminal phalanges and intercalary disks. It is,

however, a very peculiar frog whose allocation to the genus *Hyla* may be considered provisional.

It differs from all Venezuelan *Hyla* in having the first finger longer than the second and in this respect it agrees more with *Gastrotheca*, a genus in which it will perhaps eventually be placed.

Hyla rubra Laurenti

Hyla rubra Laurenti, 1768, Syn. Rept.: 35: America; Boettger, 1892, Kat. Batr. Samm. Mus. Senckenb.: 45; 1896, Ber. Senckenb. Naturf. Ges.: LIV; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 39, 43.

1 (U.P.R. 152) Sn. Fdo. de Atabapo, vi.50.

Description. Snout long, subovoid; tongue oval, adherent and indistinctly nicked behind; vomerine odontoids in two short, transverse groups between the moderate, oval, choanae; eye diameter shorter than distance between eye and nostril; interorbital space as broad as an upper eyelid; canthus rounded, indistinct; loreal moderately oblique, slightly concave; tympanum distinct, about ¾ the eye diameter; a flat, indistinct supratympanic fold; no external rudiment of pollex; subarticular tubercles small; fingers free, the first shorter than second; larger disks about ½ the size of the tympanum; two small metatarsal tubercles; toes taken in order from first to fifth exhibit the following phalanges free of web: 2, 1, 1½, 2, 1; heel of the adpressed hind limb extends to the eye. Skin above, with small granules on the head and scapular region; flanks granular; throat granular. Male with a slight, subgular vocal sac.

Color. Above, very dark gray, almost black; limbs lighter than the body color; flanks, anterior part of the thighs, and ventroposterior part of the tibiae obscurely mottled with light; a broad but short longitudinal white line along the posterior part of the thigh. Ventral surfaces dirty white.

Measurements. ♂ Snout-vent 41; head breadth 12.5; head length 14; femur 16; tibia 20.

Additional Localities. Caracas (Boettger, 1892); Upper Orinoco (Boettger, 1896).

Range. The Venezuelan Guayana and the Coastal Range. Central America through Colombia to Bolivia on the west and British Guiana to Bahia on the east. Boulenger (1882) records it from Uruguay, and Cei (1956) cites Mirando Ribeiro as including Argentina within the range of the species. Cochran (1955) does not include it in the fauna of S. Brasil.

Remarks. The San Fernando specimen is large for the species and its very dark color is different from any specimen of *Hyla rubra* I have seen. It agrees with *H. rubra,* however, in all structural characters and the markings that are usually shown on the limbs of *H. rubra* are present, though obscure, in the San Fernando example. The white line on the thighs appears to be a longitudinal expansion of a spot and perhaps does not have any importance.

An M.C.Z. specimen from Central America, and another from Pará, Brasil, exhibit very peculiar spotting all over the dorsum. A group from Barana Dist., British Guiana, shows rounded snouts (in cross-section) which are much elevated between the eyes and in the intercanthal region. Probably *H. rubra* as known today represents a composite of several related forms.

In several museums, specimens of *Hyla columbiana* Bttgr. are confused with *Hyla rubra.*

Hyla rubra x-signata Müller, 1927, *H. rubra hübneri* Melin, *H. rubra inconspicua* Melin and *H. rubra duartei* Lutz, B., have been described from different localities. I have preferred to use the binomial until the whole species is studied and its components segregated.

Hyla boulengeri (Cope)

Scytopis boulengeri Cope, 1887, Bull. U.S. Nat. Mus., *32*: 12: Nicaragua.
?Hyla acuminata Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 39, 43.
Hyla boulengeri Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 40.
?Hyla palpebrogranulata Lutz, A. (not Andersson), 1927, Mem. Inst. Osw. Cruz, *20*: 39, 44, pl. XI, fig. 20, 20a.
Hyla boulengeri Shreve, 1947, Bull. Mus. Comp. Zool., *99*: 537.

1 (M.C.Z. 12888) Bejuma, nr. Río Montero, ii.20.
1 (M.C.Z. 25984) Paují, iv.45.
1 (U.M.M.Z. 55828) Aroa.
1 (U.M.M.Z. 55829) Río Bejuma.

Description. Snout subacuminate, projecting beyond the mouth; tongue cordiform, free and nicked behind; vomerine odontoids in two short, transverse groups between the large, oval choanae; eye diameter shorter than distance between eye and nostril; interorbital space about 1½ times broader than an upper eyelid; canthus indistinct; loreal oblique and concave; tympanum ⅔ the eye diameter; no rudiment of pollex; subarticular tubercles rather small; fingers free, their disks transversely oval and about ½ the size of the tympanum; no tarsal fold; metatarsal tubercles small; toes taken in order from first to fifth

exhibit the following phalanges free of web: almost all, 1, 1¼, 2½ to 3, 1; head of the adpressed hind limb extends to the tip of the snout. Skin above, mostly smooth. Male with a subgular vocal sac.

Color. Above, brown with a triangular spot between the eyes that is occasionally light margined; a few, small, dark spots on the anterolateral part of the dorsum; thighs with a longitudinal brown band above and black transverse bars in front and behind it; on reaching the longitudinal band, the transverse bars assume a much lighter color; space between the bars pinkish red (alive); hidden part of the tarsus and upper part of the foot rose and black spotted; rest of the limbs uniform or with wide transverse spots. Below, grayish or dirty white; vocal sac generally infuscate.

Measurements. Snout-vent ♂ 34, ♀ 58.5; head breadth ♂ 11, ♀ 16; head length ♂ 12.5, ♀ 16; femur ♂ 18, ♀ 24; tibia ♂ 21.5, ♀ 30.

Habits. The Puerto Ayacucho specimens were collected while calling from tall grass in an inundated area.

Additional Localities. Maracay (Lutz, 1927); Orinoco R., below mouth of Caroní (M.C.Z. 19919); Orinoco R., nr. mouth Caño Horobopo (?) (M.C.Z. 19920); Puerto Ayacucho (U.P.R. 132-8).

Range. The Venezuelan Guayana and the Coastal Range. Central America, Colombia and British Guiana.

Remarks. It is possible that the specimens from northern Venezuela are different from those of Central America. A topotypical specimen examined (M.C.Z. 4896) has distinct tubercles on the head and anterior part of the body, the heel extends to between eye and nostril and the bars on the thighs cross this limb segment above without losing their color or being interrupted by the median longitudinal band. There are also black spots (and probably reddish ones) on the groins and posterior part of the flanks. The material from Puerto Ayacucho also looks different from that of northern Venezuela and Nicaragua but possibly this is because all of the Puerto Ayacucho specimens are males while the others are mostly females. They are very rugose above; the heel reaches between eye and nostril; the thigh bars are very well defined and not confluent and irregular as in the individuals from the north; the head looks much narrower; the toes are slightly less webbed and the color above is dark gray, without dorsolateral spots.

I have placed *Hyla palpebrogranulata* Lutz in the synonymy of this species pending further investigation. According to Andersson, who is the author of *Hyla palpebrogranulata,* this species "agrees most nearly with *Hyla phrynoderma* Boulenger and with *Hyla verrucigera* Werner and the related species of this one, *H. buckleyi* Gthr. and *H. lepreurii* Blgr." As the last two forms are different and unrelated to *H. phrynoderma,* the comparison makes one feel uncertain as to the appearance of this frog. Mr. Shreve has called to my attention that *H. phrynoderma* Blgr., 1889, is probably a synonym of *H. acuminata* Cope, 1862; and *H. acuminata* Blgr., 1882, a synonym of *H. boulengeri.*

It also appears that *Hyla acuminata* Lutz, which was perhaps identified by using Boulenger's catalogue, is also a synonym of *Hyla boulengeri.* However, I have placed it in the synonymy with some misgivings, for in referring to that species, Lutz speaks of two vocal sacs in the male, a peculiarity that is only found in *Hyla tibiatrix* among the *Hyla* reported from the Coastal Range. I doubt, however, that Lutz could have confused *H. tibiatrix* with *H. acuminata.*

Hyla palpebrogranulata Andersson also seems to be a synonym of *H. acuminata* Cope, but the figure of this species shown by Lutz apparently belongs to *H. boulengeri.* The animal is represented with a pointed snout tip such as is found in Miranda Ribeiro's *Garbeana garbei,* a form which is probably conspecific with *H. boulengeri.*

Lutz also mentions *Hyla boulengeri* in his report, but this is based on material that was not examined by him. The specimens he collected were apparently given only two names: *acuminata* and *palpebrogranulata.*

Hyla baumgardneri sp. n.

Type. Museum of Comparative Zoology No. 28563, a ♂ from Casa de Julián, Territorio Amazonas. Coll. J. A. Rivero, 26 May, 1950.

Diagnosis. A small *Hyla* of the *rubra* group with flat head; almost transverse vomerine teeth between the choanae; adherent tongue; tympanum ½ the eye diameter; fingers free; no rudiment of pollex; short hind limbs and chlorine green color in life.

Description. Snout flat above, subovoid; tongue oval, nicked and very slightly free behind; vomerine odontoids in two short, transverse groups between the small choanae; eye diameter equal

to distance between eye and nostril; interorbital space a little broader than an upper eyelid; canthus rounded, indistinct; loreal scarcely oblique, flat; tympanum small but distinct, about ½ the eye diameter; a slight supratympanic fold; metacarpal tubercles indistinct; no external rudiment of pollex; fingers free, their disks almost as large as the tympanum; a small, oval inner and an indistinct outer metatarsal tubercle; toes taken in order from first to fifth exhibit the following phalanges free of web: almost free, 1¾, 1½, 2¾, 1; heel of the adpressed hind limb extends to the eye. Skin above, smooth except on the head, snout, and upper eyelids where it is sparsely granular; a fold across the chest. A large subgular vocal sac.

Color. Above, chlorine green (in life) or yellowish gray (alcohol after formalin); canthus and supratympanic fold slightly darker than the rest of the head but with no well defined streak. Below, greenish yellow (in life) or grayish white.

Measurements. ♂ Snout-vent 29; head breadth 9; head length 9.5; femur 11.5; tibia 13.5.

Habits. The type and U.P.R. 184 were collected at night while calling from shrubs at about 5 ft. from the ground. There was a stream running over a granite bed (see *Leptodactylus rugosus*) at some twenty feet away and as it was raining considerably at that moment, most of the ground under the shrubs was inundated. Most of the La Culebra specimens came from tall grass (savanna) in an inundated area but one was taken in a thatched roof at about 1:00 A.M. The noise made by the frog was so annoying that those trying to sleep beneath the thatch united to catch the intruder. The voice is a cicada-like "crrrr" that may continue without interruption for several minutes.

Two pairs of specimens were in amplexus on grass blades about two feet from the water.

Remarks. Except for a slight variation in the amount of web and other characters mentioned below, the paratypes agree in all essentials with the type.

Among the paratypes there are two females (U.P.R. 149, 179) both collected at La Culebra, 1,000 ft., and having a snout-vent length of 32 and 29.5 mm., respectively. The other paratypes were taken at Casa de Julián (U.P.R. 184), La Culebra (U.P.R. 150-1, 176-8, 181-2) and Puerto Ayacucho (U.P.R. 180). Except for specimen No. 180 which is smaller than usual (22.5 mm.) and has a more pointed snout, there is no great variation among the members of the group. A triangular interorbital spot may be present or absent.

This species is very similar to the Panamanian *H. altae* Dunn (= *H. staufferi, fide* Taylor, 1952) and both are so similar to *H. rubra* that they might be mistaken for juveniles. *H. baumgardneri* is, however, distinguished from the type of *Hyla altae* by its flatter, granular snout which does not project beyond the mouth, probably larger size (type of *altae*, 23 mm.), different coloration, and probably different voice. As in *H. rubra, H. altae* has two curved longitudinal lines on the dorsum from behind the eyelids to groin, and the basic color is light brown. A cross-section of the snout of *H. altae* would be semicircular (as in British Guianan *H. rubra*) and the voice, as described by Dunn, is a harsh "whark." Dr. Dunn explains, however (letter, 14.4.51), that the Panamanian frogs were calling with so many others, that there is a distinct possibility the cries may have been confused.

From *Hyla rubra*, *Hyla baumgardneri* differs in its smaller size, shorter snout, smaller tympanum, darkened eyelids and different coloration.

Hyla luteocellata Roux

Hyla luteo-ocellata Roux, 1927, Verhandl. Naturf. Ges. Basel., *38*: 260: El Mene, Prov. Falcón, Venezuela.

No material examined.

Original Description. Head somewhat broader than long; snout short, scarcely longer than the orbital diameter; nostrils near the tip of the snout; tongue oval, broader than long, entire and slightly free behind; vomerine odontoids in two small groups between the choanae; eyes large, protuberant; interorbital space twice as broad as an upper eyelid; canthus moderate; loreal high, slightly oblique; tympanum hidden; second finger shorter than fourth; digits webbed at the base only; disks large; hind limbs long; an outer, oval, metatarsal tubercle; subarticular tubercles rounded and rather small; toes ⅔ webbed; last two phalanges of the fourth toe free; disks of the toes equal to those of the fingers. Skin above, smooth. Below, throat and breast smooth; a fold across the chest; belly reticulate and widely granular.

Color. Above, grayish brown merging into light gray on the sides and sprinkled on the trunk and head with small, black spots; a more or less distinct brown band between the eyes; a narrow light line, commencing at the tip of the snout, follows the canthus rostralis and continues behind the eye, bordering the light dorsolateral region below; loreal region with a dark

brown band that extends to the side of the body passing over the forelimb; a white spot on the hind part of the flanks; a white (yellow in the living animal?) spot below the eye is surrounded with brown and extends to the lower jaw; inner aspect of the thigh occupied by a large, elongated-oval, white-margined, black spot; upper surfaces of the thighs light brown with more or less rounded white or yellowish spots; tibia grayish above, showing a light elongated spot on its lower surface near the articulation with the thigh; tarsum speckled with white and gray. Belly whitish; throat with some brown spots.

Measurements. ♂ Snout-vent 31; hind limb 32.

Remarks. The species is only known from the two male individuals described by Roux. It is well characterized, however, and not likely to be confused with any other Venezuelan *Hyla*.

Hyla marmorata marmorata (Laurenti)

Bufo marmoratus Laurenti, 1768, Syn. Rept.: 29: Surinam.

4 (U.P.R. 126-9) Sn. Fdo. de Atabapo, vi.50.

Description. Snout short, almost semicircular, equal or slightly longer than the eye diameter; tongue subcircular, a little free and nicked behind; vomerine odontoids in two short, transverse and juxtaposed groups between the small, round choanae; interorbital space more or less equal to an upper eyelid; canthus rounded; loreal little oblique and convex; tympanum distinct, ½ to ⅔ the eye diameter; a loose fold of skin from elbow to flanks and an external fringe from elbow to disk of last finger; no rudiment of pollex; subarticular tubercles flat; fingers depressed, exhibiting the following phalanges free of web: 1½, 1, 2, 1; the web extends to the disks as distinct lateral fringes; disks almost as large as the tympanum; a festooned, lateral fringe from knee to disk of outer toe; two metatarsal tubercles, the outer, small and inconspicuous, the inner oval and prominent; toes fully webbed with the exception of the fourth where 1½ to 2 phalanges are left free; disks of the toes smaller than those of the fingers; heel of the adpressed hind limb extends to the eye. Skin above, mostly smooth. Male with an external subgular vocal sac.

Color. Above, grayish brown, marbled with darker tones of brown; a light, hour-glass marking between the eyes, broadened anteriorly at the snout; anterior and posterior parts of the thighs orange (whitish in alcohol) with a few dark, well defined spots; a longitudinal streak of different shades of brown along

the upper part of the thighs; tibial segment with dark, transverse spots on a lighter brown background. Below: throat, belly and ventral surface of thighs orange, with numerous small, black spots; lower lip dotted with white; tibiae, tarsi and toes black; web of fingers and toes orange and black.

Measurements. ♂ Snout-vent 35; head breadth 11; head length 10; femur 15; tibia 11.

Habits. The four males were collected, while calling, from the leaves of a bush near a rain pool. Surrounding area, savanna.

Range. The Venezuelan Guayana. The species extends from the Guianas to Brasil (Angra dos Reis), Perú and Bolivia. *Hyla melanargyrea* and *Hyla senicula*, now considered races of *marmorata*, were described from Matto Grosso (headwaters of Xingú) and Río Napo or Upper Marañón, respectively.

Remarks. The color recorded was based on observations made on a living frog at night with the aid of a flashlight. It is possible that the orange may be actually red.

Hyla tibiatrix tibiatrix Laurenti

Hyla tibiatrix Laurenti, 1768, Syn. Rept.: 34 (type loc. not cited).

Hyla venulosa Boettger, 1893, Ber. Senckenb. Naturf. Ges.: 40; Stejneger, 1902, Proc. U.S. Nat. Mus., *24*: 180; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 39, 44, pl. xiv, figs. 33, 33a, b, c, 34; Röhl, E., 1948, Fauna Descr. de Ven., ed. 2: 401, fig. 181.

Hyla nigromaculata Boettger, 1895-6, Ber. Senckenb. Naturf. Ges.: LIV.

Phrynohyas zonata Duellman, 1956, Misc. Publ. Mus. Zool. Univ. Mich., No. 96: 35, pl. v, figs. 1, 2; pl. vi, figs. 1, 2.

2 (U.S.N.M. 22545, 27797) La Guaira, vii.02.
1 (U.S.N.M. 128792) Los Canales, v.39.
1 (U.S.N.M. 80612) nr. Carapa, x.29.
1 (U.S.N.M. 36377) Caicara, v.05.
2 (U.S.N.M. 117098-9) Caripito, 42.

Description. Snout short, rounded; tongue cordiform, slightly nicked and free behind; vomerine odontoids in two transverse groups between the moderate choanae; eye diameter shorter than distance between eye and nostril; interorbital space more or less equal to an upper eyelid; canthus rounded; loreal moderately sloping, concave; tympanum ⅔ to ¾ the eye diameter, its dorsal margin covered by a glandular fold that runs to the shoulder; a number of rounded glandules behind the angle of the mouth; no external rudiment of pollex; subarticular tubercles not large but prominent; first finger shorter than second; taken in order

from first to fourth the fingers exhibit the following phalanges free of web: 2, 1½ to 1¾, 2½ to 3, 2; larger disks about the same size as the tympanum; a slight tarsal fold; toes exhibiting the following free phalanges: 1½ to 1⅔, 1 to 1¼, 1, 2 to 2½, 2 to 2¼; heel of the adpressed hind limb extends to the eye. Skin above, smooth, or more usually with scattered tubercles and warts; flanks glandular. Male with two vocal pouches at the angle of the mouth and a brown rugosity on the inner side of the first digit.

Color. Above, light brown, marbled, spotted or with undulating broad bands that form variable patterns; hind limbs crossbarred, mottled or dotted with dark brown; the crossbars, when present, are usually broad, with concave ends that enclose an almost circular light spot.

Measurements. Snout-vent ♂ 60.5, ♀ 76.5; head breadth ♂ 20.5, ♀ 25.5; head length ♂ 18.5, ♀ 21.5; femur ♂ 28.5, ♀ 34; tibia ♂ 29.5, ♀ 37.

Habits. Robinson (*in* Stejneger, 1902) describes the voice of this species as "A monotonous note like the bleating of a goat and fully as loud."

Additional Localities. Maracay (Lutz, 1927); La Guaira (Stejneger, 1902 [= U.S.N.M. 22545, 27797]); Maturín (Boettger, 1893).

Range. The Coastal Range, the eastern part of the Llanos (Caripito), the Delta and the Venezuelan Guayana. Central America to Bolivia (Procter, 1921) and from Trinidad and the Guianas to N. Brasil. Cochran (1955: 55) mentions its occurrence in Argentina; Peracca (1904) has reported the species from Paragnay. Duellman (1956) considers those from Minas Gerais, Paragnay and Argentina to represent *Phrynophyas hebes* (*Hyla hebes*).

Remarks. In 1956, in a comprehensive study of the frogs included under the name *Hyla venulosa*, Duellman suggests that the neotropical hylid frogs with two lateral vocal sacs situated behind the angle of the jaw, without a frontoparietal fontanelle, with free cranial skin and bifid maxillary teeth should be placed in the genus *Phrynohyas* of Fitzinger. He has split *Hyla venulosa* auct. into a number of species, two of which are represented in Venezuela. He uses the name *Phrynohyas ingens* for the form that occurs in the Maracaibo Basin and *Phrynohyas zonata* for

the one that occurs in the Coastal Range and elsewhere in northern South America. He considers *Hyla tibiatrix* Laurenti a *nomen dubium* for the following reasons:[1]

1. *Hyla tibiatrix* Laurenti is based on Seba I. 71. 1-2 and this drawing may represent any of the forms comprised by *H. venulosa* auct.
2. The type locality given is America.
3. The figure in Seba shows no color pattern and it might possibly show a casqued head.

There does not seem to me to be much doubt regarding the identity of Seba's picture with *Hyla venulosa* auct. I believe the casque would have been mentioned if it existed and no reference is made to it; to me it does not appear that a casque is represented in the drawing.

In their paper of June 1951, Dunn and Stuart express themselves regarding the restriction of type localities. Re-wording articles 29 and 31 of the Laws of Nomenclature, they state that ". . . if a species is divided into two or more restricted species, its valid name must be retained for one of the restricted species" and further on ". . . the division of a species into two or more restricted species may automatically involve a concomitant selection or restriction of type localities as well as of type specimens . . ."

I believe it would have been much simpler and more convenient, to restrict the type locality rather than to consider *Hyla tibiatrix* a "*nomen dubium.*" As there are only three forms of the presently discussed *Phrynohyas* in South America, and of these, at least one is probably a race of another (according to Duellman, *hebes*, of S. Brasil, Argentina and Paraguay is perhaps a race of *zonata* of the north of South America), the third being restricted to the Maracaibo Basin, the probabilities are that Seba's drawing represents *zonata*. If we declare "*nomina dubia*" all the doubtful forms whose type locality is America, very many well known names of frogs and other animals will have to disappear from our nomenclature.

In trying to relate *Hyla taurina* with the *Phrynohyas* and other related groups, I ran into a few difficulties. *H. taurina* has bicuspid teeth, but this character is shared with *H. boans, H. raniceps, H. septentrionalis* and according to Noble (1931: 123)

[1] In Bull. Zool. Nomencl., *12* (5), 1956, Duellman makes a form request to the International Commission to declare *H. tibiatrix* Laurenti a nomen dubium.

with most metamorphosed Amphibia. Cope (1865b: 108) included *Hyla taurina* (as *Osteocephalus*) among the frogs with a frontoparietal fontanelle, but in his "Batrachia of North America" (1889: 322) he rearranged his key and "*Osteocephalus*" fell among the hylids with no fontanelle. I have examined one specimen of this species, two of *H. boans* (*H. maxima* auct.) and one each of *H. raniceps, H. crepitans, H. rubra, H. acuminata* (*H. phrynoderma* auct.), *H. mesophaea, H. buckleyi, H. boulengeri, H. leprieurii, H. imitatrix* and *H. vilsoniana*. All the frogs having two lateral vocal sacs[1] (*taurina, mesophaea, buckleyi, leprieurii, imitatrix*) lacked the frontoparietal fontanelle, but there are four species, without lateral vocal sacs (*boans, rubra, acuminata, boulengeri*) in which a fontanelle could not be detected. *H. taurina* agrees with *H. venulosa* auct. (Duellman's *Phrynohyas*) in having a glandular skin (males) but in this respect it differs from *Hyla mesophaca* and most *H. imitatrix,* both of which on the other hand, have lateral vocal sacs and lack the frontoparietal fontanelle. If the characters of the skin and teeth are not considered for characterizing *Phrynohyas*, we are left with the lateral sacs, and the lack of fontanelle and of skin ossification to distinguish the group from other hylids.

H. taurina agrees with *H. leprieurii* (with which it is very closely related) and *H. buckleyi* in the character of the vomerine teeth (/‾ ‾\-shaped in the first two, /\-shaped in the latter), a character they share with *H. boans, H. geographica* and *H. crepitans* but not with *H. venulosa* auct., *H. imitatrix* and *H. mesophaea*. Is it possible that there are two groups of frogs with lateral vocal sacs and solid skull roof, each one of them having a different origin? This is only a possibility but one that cannot be discarded. Liu has expressed the opinion that "the evolution of the vocal sac does not always parallel the steps of the evolution of species or other groups, the exceptions being due to independent origin of the vocal sacs or to acceleration or retardation of evolution in this character" (1935: 29).

This discussion does not, by any means, prove that Duellman's conclusions are incorrect. It does prove, however, that a detailed study of related forms is an absolute necessity before establishing any generic or even subgeneric boundaries. Until such a study is made, the name *Hyla tibiatrix* is maintained for the species under consideration. The type locality is hereby restricted to Surinam.

[1] Following the classification of Liu, 1935.

The lack of frontoparietal fontanelle in *H. boulengeri, H. rubra, H. phrynoderma* and perhaps in other *Hyla* of the *rubra* group suggests the need for further and more detailed study of these frogs, which are also characterized by lacking any web between the fingers.

Dr. Mertens informs me that the *Hyla nigromaculata* mentioned by Boettger in his 1895-6 report is really *Hyla tibiatrix.*

According to Röhl (1949) the common name of this frog in Venezuela is "rana lechera."

Hyla tibiatrix ingens (Duellman)

Phrynohyas ingens Duellman, 1956, Misc. Publ. Mus. Zool. Univ. Mich., No. 96: 22, pl. ii, fig. 2.

1 (C.N.H.M. 2604) Orope, 08.
4 (U.M.M.Z. 55567-70) La Fría.
1 (U.M.M.Z. 57397) Sabana de Mendoza.

Description. Hyla tibiatrix ingens is distinguished from the typical form by having a more or less uniform color above (brown with darker brown dots, especially on the posterior half) and by its greater size and thicker, more glandular skin.

Measurements. ♀ snout-vent 105; head length 30; head breadth 33.5; femur 49.4; tibia 54.3.

Habits. The following paragraph is quoted from Duellman, who quotes from Baker: "Two pairs of these big frogs were copulating in a peccary wallow pond near a big tree. The male makes a loud noise like dropping a rock into a vessel partially filled with water. After heavy rains, eggs on surface (of water) formed films two or three feet across."

Range. The Maracaibo Basin.

Remarks. There is a 112.5 mm. female specimen at U.M.M.Z.

Hyla vilsoniana meridensis ssp. n.

Hyla wilsoniana Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 40.

Type. Museum of Comparative Zoology No. 2527, a ♀ from Mérida, 1630 m.

Diagnosis. Hyla vilsoniana meridensis differs from the typical form in having white spots or marbling on the posterior part of the thighs, flanks, axillae, underside of the hind limbs, hidden portions of the tibiae and tarsus and dorsal part of the foot.

Description. Snout short, rounded; tongue broad, ⅓ free and nicked behind; vomerine odontoids in two transverse groups between the round or oval choanae; eye diameter greater than

distance between eye and nostril, but shorter than the snout; interorbital space slightly broader than an upper eyelid; canthus rounded, indistinct; loreal moderately oblique, not concave; tympanum ½ the eye diameter; a slight supratympanic fold; two faint metacarpal tubercles; one flat inner metatarsal tubercle but no outer; subarticular tubercles of fingers and toes moderate but rather flat; fingers with a short basal web, the first shorter than second; larger disks about the same size as the tympanum; toes taken in order from first to fifth exhibit the following phalanges free of web: 1, 1, 1⅓, 3, 1; heel of the adpressed hind limb extends to the middle of the eye. Skin above, smooth. Below, with large and very distinctive flat granules; a transverse pectoral fold.

Color. Above, slate or bronze colored (said to be green, alive); axillae, groins, anterior and posterior aspects of the thighs, ventral portions of the tibiae, hidden portions of the tibiae and tarsus and dorsal part of the foot spotted with white. Below, yellowish orange (in life?) or slate, the granules lighter.

Measurements. ♀ Snout-vent 42; head breadth 13; head length 12.5; femur 18; tibia 20.

Additional Localities. Chama (U.S.N.M. 71114; U.M.M.Z. 3574; C.N.H.M. 3573-4); La Culata (A.M.N.H. 10671-3); Venezuela (A.M.N.H. 10666-7, 10669).

Range. The Subtropical Zone of the Mérida Andes.

Remarks. The eye is equal to distance between eye and nostril in a few specimens and in some the interorbital space is equal to an upper eyelid. The web may be 1¼, 1¼, 1½, 2⅞, 1¼.

Some frogs (A.M.N.H. 10671-3) are labeled "La Culata, N. W. Ecuador." My reasons for including the specimens here are as follows:

1. No place with such a name has been found in Ecuador.
2. *Hyla vilsoniana* has not been reported otherwise from Ecuador.
3. If *Hyla vilsoniana* does occur in Ecuador it is not likely to be on the western side of the Andes.
4. There is a place by the name of La Culata in Venezuela.
5. The specimens agree in all details with Venezuelan animals rather than with those from Colombia.
6. Specimens with approximately the same date and received from the same dealer were collected in La Culata, Venezuela.

Dunn (1944b: 72) has placed *H. vilsoniana* Cope in the synonomy of *H. labialis* Peters, 1863. Whether or not this is correct I am not prepared to say, but I am well aware of a large, *vilsoniana*-like frog that occurs in Gutierrez, Colombia. In some museums, specimens of this species are determined as *H. labialis*, while in others it is known as *H. gularis*. Three alternatives are possible:

1. That *H. gularis* is a distinct species while *H. vilsoniana* is a synonym of *H. labialis*.
2. That *H. gularis* is a synonym of *H. labialis* while *H. vilsoniana* is a distinct species.
3. That *H. labialis* is a distinct species while *H. gularis* is a synonym of *H. vilsoniana*.

As both forms are very similar and it is not possible to come to any conclusion without examining the types, I have decided for the present to use the name *vilsoniana* on the basis that in two cases out of three this should be the proper name to use.

All the 12 Venezuelan specimens examined show the characteristic spotting of the limbs that characterize the race. It is possible that differentiation of *H. v. meridensis* occurs at or near the Depression of San Cristóbal in Venezuela. Colombian specimens available for comparison (A.M.N.H. 16738-54, Bogotá, 5456-61, 53822-4, cotypes, nr. Bogotá; M.C.Z. 7299-7308, 20936-7, 24196, Bogotá and San Pedro, Antioquía) do not show any limb or flank spotting, except perhaps A.M.N.H. 53822, where there is some indication of it.

Hyla minuta Peters

Hyla minuta Peters, 1872, Monatsb. Akad. Wissensch. Berlin: 680: New Freiberg, Brasil.

14 (U.P.R. 153-66) Pto. Ayacucho, vi.50.
1 (U.P.R. 167) Sanariapo, vi.50.

Description. Snout short, almost semicircular, little longer than the eye diameter; tongue oval, slightly nicked and free behind; vomerine odontoids in two short, slightly oblique series between the round choanae, their posterior extremities directed inwards; eye diameter greater than distance between eye and nostril; interorbital space much broader than an upper eyelid; canthus rounded; loreal almost vertical, slightly convex; tympanum indistinct, partly covered by a loose supratympanic fold, about ½ the eye diameter; no external rudiment of pollex; subarticular tubercles small and indistinct; fingers taken in order

from first to fourth exhibit the following phalanges free of web: almost all, 1⅓ to 1½, 2⅔, 2 to 2¼; disks small, about the same size as the tympanum; no tarsal fold; toes depressed, fully webbed except in the third and fourth where the membrane does not extend to the disks; disks of toes not much more expanded laterally than the width of the phalanges; heel of the adpressed hind limb extends to between eye and nostril. Skin above, smooth; a fold across the chest; male with a very large, subgular vocal sac.

Color. Above, straw colored or yellowish brown with definite, light-margined, darker spots of irregular form and size. The spots are generally saddle or chevron-shaped, but hour-glass, triangular, or round ones are often found. The marginal lines are fine and of a golden or cream color, but spots without the marginal lines are sometimes present although apparently not in the same individual having the margined ones. Very few of the specimens are uniformly brownish or grayish. A small transverse line at the anus and a short, longitudinal one along the heel seem to be constant characters. The thighs are uniformly colored, the rest of the hind limbs generally marked with light margined spots; forelimbs equally marked. Ventral surfaces immaculate.

Measurements. Snout-vent ♂ 23, ♀ 26; head breadth ♂ 8, ♀ 8.9; head length ♂ 7.5, ♀ 8; femur ♂ 11, ♀ 11; tibia ♂ 12.5, ♀ 12.

Habits. Hundreds of these frogs were seen in a shallow inundated area between Puerto Ayacucho and Sanariapo. All were males, however, and upon returning to the place two nights later, the animals had deserted and no eggs were found. Most of the frogs were calling from grass blades or from the water, which was not deeper than their bodies. The pool was actually in a grassland but there was high forest some yards to the east and west.

In Marahuaca, collecting was carried out in a similar situation but the forest at this place was heavy and very humid.

Additional Localities. Temiche (U.P.R. 169-75, 260-262).

Range. The Venezuelan Guayana. Trinidad and the Guianas to southern Brasil.

Remarks. The specimens from Temiche are smaller, much darker, and lack the ornamental coloration of the lowland group. Probably they should be given a racial name.

Specimens from Río de Janeiro are also smaller and probably slightly less webbed than the animals from Puerto Ayacucho.

Hyla misera Werner

Hyla misera Werner, 1903, Zool. Anz., *26*: 252: Caracas, Venezuela; Nieden, 1923, Das Tierreich. Anura, I: 263; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 39, 43, pl. xi, fig. 16 and pl. xv, fig. 37.

1 (M.C.Z. 26150) Cerro Cosme, x.39.

Description. Head as broad as long; snout short, rounded, slightly longer than the eye diameter; tongue rounded, nicked and slightly free behind; vomerine odontoids in two short, slightly oblique groups between the moderate choanae, their posterior extremities directed inwards; eye diameter greater than distance between eye and nostril; interorbital space broader than an upper eyelid; canthus indistinct; loreal slightly oblique, not concave; tympanum not very distinct, little less than ½ the eye diameter; subarticular tubercles of fingers and toes not very distinct; fingers short, taken in order from first to fourth they exhibit the following phalanges free of web: all, 1½, 2½, ½; a tarsal fold; one small, oval inner, but no outer, metatarsal tubercle; toes fully webbed, except for the third and fourth in which the web does not extend beyond the penultimate articulation; disks of the toes smaller than those of the fingers; heel of the adpressed hind limb extends to between eye and nostril. Skin above smooth. Male with a subgular vocal sac.

Color. Above, brown with obscure longitudinal markings of darker color and dark punctuations under a lens; a dark canthal streak. Below, light brown.

Measurements. ♂ Snout-vent 20; head breadth 6.2; head length 6.2; femur 10; tibia 11.

Additional Localities. Caracas (Nieden, 1923 = Werner, 1903?); Caracas and Maracay (Lutz, 1927); Kunana, Perijá Mts. (Alemán, 1953).

Range. The Falcón Region and the Coastal Range, and the Parijá Mts.

Remarks. This form is rather similar to *Hyla minuta*, from which it can be distinguished by its smaller size, straighter loreal region, distinct tarsal fold and less ornate coloration as well as by the lack of the anal and heel lines that are present in *minuta*.

The Venezuelan specimen differs from the original description and from Colombia (M.C.Z. 16077, Tucurinca; M.C.Z. 13751-3, Sevilla) and Trinidad material (M.C.Z. 17809-17900, St. Augustine) in lacking the very distinct darker coloration of the loreal region and flanks. The Trinidad and Colombian animals, which look identical to me, have a white line that extends from tip of

the snout, over the outer margin of the upper eyelid to the sacral region or beyond. This may have existed in the Venezuelan example but its presence is not evident in the present condition of the animal.

Hyla misera is closely related to *Hyla microcephala,* from which it is distinguished by lacking the well defined dorsal pattern of the latter (present but very faintly indicated in preserved *H. misera*). The dark lateral coloration and the dorsolateral white line that divide the dorsal and ventral colors of *misera* are present in *microcephala,* but the lateral color does not seem to extend as far down ventrally as in *misera.*

In northeastern Colombia, *H. misera* is found as far west as west of Sierra de Santa Marta, and it has been recently collected by Alemán at the Perijá Range of Venezuela. It seems that *H. microcephala* meets *misera* somewhere in the Magdalena Valley and that the latter is only a race of *microcephala.* Until a more complete examination of material is made, I have preferred to continue using the binomial.

Several races of *Hyla microcephala* have been described from Central America.

Hyla oropihla planicola Lutz and Lutz

Hyla (*Sphoenohyla*) *planicola* Lutz, A. and B., 1938, Ann. Acad. Bras. Sci., *10*: 182: Recreio dos Bandeirantes, Federal District, Brasil.

1 (M.C.Z. 19917) Orinoco R., below Barraneas, ii.35.

Description. Head small, flat; snout short, rounded at the tip and projecting beyond the mouth; tongue cordiform, slightly indented and free behind; vomerine odontoids almost imperceptible, probably in two round groups behind and between the small, round choanae; eye small, not protruding, its diameter equal to distance between eye and nostril; interorbital space about twice as broad as an upper eyelid; canthus apparently well defined; loreal vertical, not concave; tympanum not very distinct, ½ the eye diameter; no projecting external rudiment of pollex, but a fairly distinct tubercle at the base of the first finger; subarticular tubercles indistinct; first finger much shorter than second; taken in order from first to fourth, the fingers exhibit the following phalanges free of web: 2, 1, 2, 1½; largest disks about as large as the tympanum; an oval, inner metatarsal tubercle; toes fully webbed, with the exception of the fourth where two phalanges are left free; heel of the adpressed hind limb extends to the anterior corner of the eye. Skin above, shagreened;

a pair of horizontal flaps at the sides of the anus. Male with an external vocal sac.

Color. Above and below, yellowish white; a light brown canthal streak.

Measurements. ♂ snout-vent 24; head breadth 7; head length 6.8; femur 11.5; tibia 12.

Range. In Venezuela known only from this specimen. British Guiana to Bolivia and southern Brasil. *Hyla orophila orophila* occurs in the mountains of southern Brasil while *Hyla orophila planicola* is restricted to the lowland. These as well as *Hyla aurantiaca surda* Cochran, from Paraná, are considered separate species by Goin (1957).

Remarks. The Venezuelan individual has slightly more webbing on the toes than animals from southern Brasil. The snout is also blunt, instead of triangular and pointed, but this is probably because it has received a blow in front. The almost total absence of vomerine teeth in this specimen is probably an abnormality. Since it has a distinct tympanum it cannot be considered as a specimen of *Hyla habra* (Goin).

Hyla aurantiaca Daudin, 1803, is preoccupied by *Hyla aurantiaca* Laurenti, 1768. This latter is based on Seba *I*, plate 71.3 which was used for the description of *Hyla boans.* Therefore, I use the name *Hyla orophila* Lutz and Lutz for the species hitherto known as *Hyla aurantiaca* Daudin.

Goin, 1957, erects the genus *Sphoenohyla*[1] for the group of frogs comprising *Hyla orophila,* on the basis of a different vocal sac, a backward projecting process in the ischium, and probable different habits. In trying to put boundaries to the genus, I dissected a few frogs, not only from South America, but also the Old World *H. arborea,* the genotype of *Hyla*, and *H. aurea* from Australia. These two show a rounded ischium, more or less as figured for the North American *H. cinerea* (Goin, 1957: 14, fig. 2), but *Hyla rubra* and to a greater extent *Hyla crepitans* show a dorsal, posterior projection as figured for *Sphoenohyla aurantiaca* (Goin, *op. cit.*). In *Hyla tibiatrix* and *H. brunnea* (Jamaica) the ischium is more extensive posteriorly than in the European or Australian frogs, but there is no notch or indentation to divide the bone into dorsal and ventral projections. If the character of the ischium is to be taken as generic, perhaps all the South American *Hyla* can be separated from the others into a different genus.

[1] Created as a subgenus by Lutz and Lutz, 1938.

Liu, 1935, classifies the vocal sacs into median subgular (internal or external), paired subgular (internal or external), and paired lateral (internal or external). According to him (*op. cit.*, pp. 33-35), all these, except the paired subgular external, are represented in the genus *Hyla*. In two species, the vocal sacs are totally absent. *Hyla aurantiaca* auct. was not studied, but *Hyla nana*, considered by Goin of the *Sphoenohyla* group, shares a median, subgular external sac with 59 of the 88 species mentioned. In comparing *Sphoenohyla* with *Hyla*, Goin does not mention what species he has compared. However, considering the different vocal sacs that are known to occur within the genus as presently known, I do not think it wise to accept the separation of *Sphoenohyla*, especially since the character of the ischium is not apparently an exclusive character of the group.

Hyla battersbyi sp. n.

Figure 11

Hyla leucomelas Günther (not Duméril and Bibron), 1858, Cat. Batr. Sal. Brit. Mus.: 110: Caracas.

Type. British Museum of Natural History No. 53.2.4.165, a ♂ from Caracas, Venezuela.

Diagnosis. A *Hyla* with transverse vomerine odontoids; well defined tympanum, about ½ the eye diameter; no external rudiment of pollex; ⅓ webbed fingers and grayish color minutely dotted with reddish brown on all the upper and lower surfaces except the forelimbs and belly.

Description. Snout rounded; tongue circular, entire and adherent; vomerine odontoids in two transverse, juxtaposed groups on level with the posterior margins of the small, round choanae; eye diameter equal to distance between eye and nostril; interorbital space somewhat broader than an upper eyelid; canthus moderate; loreal very slightly oblique, concave; tympanum well defined, about ½ the eye diameter; a supratympanic fold; no external rudiment of pollex; first finger shorter than second; subarticular tubercles rounded, distinct; fingers taken in order from first to fourth exhibit the following phalanges free of web: practically all, 1⅞, 2½, 2½; larger disks as large as the tympanum; an almost impereeptible tarsal fold; one internal, oval metatarsal tubercle; toes exhibiting the following free phalanges: 1¾, 1⅘, 1¼, 2 to 2½, 1½; heel of the adpressed hind limb extends to between eye and nostril. Skin above smooth, below

granular on the belly and thighs; a transverse pectoral fold; male with a slight subgular vocal sac.

Color. Above, light brown with numerous small but sharply defined reddish brown dots that appear more profusely on the top and sides of the head, flanks and limbs; a dark canthal and supratympanic streak; loreal whitish with dark dots; limbs crossbarred. Belly, ventral surface of forelimbs and granular ventral part of the hind limbs uniformly light brownish, the rest of the hind limbs and the throat minutely dotted; a pair of callous, white spots on the buttocks.

Fig. 11. *Hyla battersbyi* sp. n. Type BM (NH) 53.2.4.165.

Measurements. ♂ Snout-vent 33, head breadth 10.5; head length 10.5; femur 17; tibia 17.

Remarks. In the dotting of its body surfaces this species agrees somewhat with *Hyla rufopunctata* Andersson, *Hyla aluminiata* Andersson (which may be the young of something else), *Hyla palmeri* Blgr., *Hyla festae* Peracca, *Hyla albida* Melin, *Hyla phyllognatha* Melin, *Hyla columbiana* Bttgr. and the young of

Hyla geographica Spix. From the first two and the young *Hyla geographica* it differs in the well exposed tympanum and in the different position of the vomerine odontoids, from *H. palmeri* and *H. festae* in the form of the odontoids, slighter inclination of the loreal region, amount of webbing, smoothness of the skin, and in having shorter legs, smaller size and different coloration than *festae*. From *H. albida* it can be rapidly distinguished by the visible tympanum, adherent tongue, lack of external rudiment of pollex, etc., and from *H. phyllognatha* by the size of the tympanum, position of the vomerine odontoids, amount of webbing, lack of external rudiment of pollex and other characters. With *Hyla columbiana* Boettger, this species agrees in several characters but it can also be readily differentiated by its well defined tympanum, completely adherent tongue and different coloration of the ventral surfaces. While *H. battersbyi* is profusely dotted on the throat and ventral surface of the hind limbs, *Hyla columbiana* is uniformly colored on these regions or more usually, distinctly variegated or marbled on the throat and belly.

I believe *Hyla variabilis* Boulenger is a synonym of *Hyla columbiana* Boettger.

Corythomantis venezolana Mertens

Hyla nigromaculata Boettger, 1896, Ber. Senckenb. Naturf. Ges.: LIV.
Corythomantis brunoi Mertens, 1926, Senckenbergiana, *8*: 137.
Corythomantis venezolana Mertens, 1950, Senckenbergiana, *31*: 1: San Fernando de Atabapo, Upper Orinoco.

No material examined.

Original Description. Skull forming a flat, bony helmet, with a rougher dorsal side and rather projecting rims; snout projecting over the mouth opening; pupil roundish, horizontal; tongue heart-shaped, slightly free, clearly notched behind; vomerine odontoids in two small groups between the choanae; no palatine or parasphenoid teeth; canthus distinct; a vertical bony ridge in front of the eye; tympanum about ⅔ the eye diameter; fingers with a short web; toes ⅔ webbed; disks of the fingers ½ the size of the tympanum, of the toes, ⅓; subarticular tubereles larger in fingers than in toes, mostly single; inner side of first finger with a large, blunt tubercle; a rather large, outer and a small inner metatarsal tuberele; heel of the adpressed hind limb extends to the anterior corner of the eye. Skin above, smooth. Belly granular.

Color. Middle of the back bright brown with darker brown marblings; thighs yellowish, with brown network; upper side

of limbs transversely banded; ventral side, gray, without pattern.

Measurements. ♂ ? snout-vent 58; anterior limb 24; posterior limb 83.

Range. Only known from San Fernando de Atabapo.

Remarks. This species can be distinguished from *Corythomantis greeningi* Boulenger by the webbing in the fingers, the narrower and more protuberant snout, the heart-shaped tongue, the not indented posterior margin of helmet and the smaller disks.

Carvalho (1941) pointed out that the specimen collected by Hübner at Sn. Fernando de Atabapo and discussed by Mertens as *Corythomantis brunoi* (1926) probably represented a juvenile of *Trachycephalus nigromaculatus* Tschudi. His conclusion was based on the fact that of the helmeted hylids comprising the genera *Diaglena, Triprion, Pternohyla, Corythomantis, Aparasphenodon* and *Trachycephalus*,[1] only the latter was described with webbed fingers and barred hind limbs.[2] The total absence of palatine and parasphenoid odontoids, a character which Mertens' specimen shares only with *Corythomantis*, is apparently attributed to immaturity of the example, which however, was 58 mm. in length.

In 1950 Mertens described *Corythomantis venezolana* on the basis of his former *Corythomantis brunoi*. I believe it is safe to conclude that Mertens re-examined his specimen in the light of Carvalho's comments and that although it was webbed and barred, he was not convinced of the identity of the animal with the genus *Trachycephalus*. Like *Aparasphenodon*, the latter is described as having palatine teeth, while *Corythomantis* lacks both palatine and parasphenoid teeth.

Examination of the genera mentioned before reveals relationships between some of them. The pupils have been described as horizontally oblong in *Aparasphenodon*, "transversely oval when expanded and subquadrangular when contracted" in *Diaglena*, a transverse slit in *Trachycephalus*, rhomboidal in *Corythomantis*, a vertical slit in *Triprion* and round in *Tetraprion*.[3] I do not consider pupil shape of generic significance if not accompanied by other characters. If this character is not considered valid for separation, two forms can probably be ranked together: *Diaglena* and *Triprion*.[4] The form of their casques is very similar

[1] In writing about these helmeted frogs, Carvalho does not mention *Pternohyla*.

[2] *Diaglena, Corythomantis, Aparasphenodon* and *Pternohyla* actually have short webs between the fingers.

[3] *Tetraprion* Stejneger and Test, 1891, was synonymized with *Diaglena* by Boulenger 1891 and with *Triprion* by Günther, 1900, but revived by Myers, 1942.

[4] And probably *Tetraprion*, which I have not had the opportunity to examine.

and with little doubt derived one from the other, perhaps *Triprion* from *Diaglena* by further specialization of the skull structure and disappearance of the palatine odontoids. These, and *Tetraprion*, are the only helmeted frogs possessing parasphenoid odontoids and they also have characteristic vomerine odontoids and general physiognomy in common.

The relationship of the other forms is not as clear. *Aparasphenodon* is said to have lateral vocal sacs (Cochran, 1955:47),[1] a character it more or less shares with *Trachycephalus*[2] and members of the *Hyla tibiatrix* group. The vomerine odontoids are more or less like those of *Hyla taurina* and *Trachycephalus* but different from the other helmeted frogs here described. The palatine odontoids are shared with *Trachycephalus* and with the Central American *Diaglena*, *Triprion* and *Pternohyla*. For the present it is perhaps more convenient to keep *Pternohyla*, *Trachycephalus* and *Aparasphenodon* in separate genera, although the relationships of the latter with *Triprion* (including *Diaglena*), seems to be quite close.

Through the courtesy of Dr. Ernest Williams, I was able to examine the skeleton of one of the only two specimens of *Triprion* at M.C.Z., and examine the sacral diapophyses of one of each of *Diaglena*, *Pternohyla*, *Aparasphenodon*, *Corythomantis*, *Garbeana* and a few other hylids. Dr. Doris Cochran kindly made available a specimen of *Trachycephalus nigromaculatus* from Brasil.

In *Diaglena*, *Triprion*, *Corythomantis*, *Pternohyla* and *Aparasphenodon*, the sacral diapophyses are considerably dilated, and there is in addition a large cartilaginous alar expansion on their free sides. Furthermore, the ilium, instead of ending at the diapophysis, is not apparently firmly attached to it and continues anteriorly under the alar expansion for a length that varies according to the genus. In *Corythomantis* the ilium extends forward of the diapophysis for only a short distance, but in the other four genera the anterior projection may be quite long. In this respect, *Corythomantis* may be the most primitive, but the examination of only one specimen is not enough to permit any conclusion. It should be remembered, however, that *Corythomantis* is also the only one of the four genera not having palatine or parasphenoid teeth.

[1] A male specimen from Rio de Janeiro (M.C.Z. 25694) shows a subgular vocal sac which is perhaps more expanded on the sides.

[2] Although it does not quite show this character, as in the latter the sacs are posterior to the angle of the jaw, while in *Aparasphenodon* they seem to be subgular.

In *Trachycephalus*, the alar expansion of the diapophysis is not too well developed and the ilium does not extend forward beyond its anterior margin. If considered to belong to the *Triprion* group, *Trachycephalus* may be thought to be the most primitive in ilium development, but it has palatine odontoids and two distinct anal flaps that it shares with the Brasilian *Hyla langsdorffi*, a large Brasilian frog with free cranial derm but great similarity with *T. nigromaculatus*. These forms may or may not be within the main line of descent of the *Triprion* group. It appears, however, that the genera *Triprion* (inc. *Diaglena*), *Corythomantis*, *Pternohyla*, *Aparasphenodon* and *Tetraprion* constitute a natural group characterized by having the skin of the head involved in the cranial ossification and an ilium that extends beyond the anterior margin of the sacral diapophysis. *Pternohyla* has undergone considerable specialization and may be an early offshoot from the main line.

Incidental to the study of the helmeted frogs of the aforementioned groups, I had the opportunity of examining specimens of *Hemiphractus braconnieri* and *Garbeana garbei* from Ecuador. From the description of the latter and examination of the Ecuadorian specimen (M.C.Z. 19662), I gather it is conspecific with *Hyla boulengeri*. As in *H. braconnieri*, the sacral diapophyses of *G. garbei* are but slightly dilated, there is no alar expansion, and the ilia do not extend forward beyond the diapophyses.

Key to the Species of Gastrotheca *Reported from Venezuela*

I. Derm of head involved in cranial ossification . . . . . *ovifera*
II. Derm of head free from cranial ossification . . . . . *williamsoni*

Gastrotheca ovifera (Weinland)

Notodelphys ovifera Weinland, 1854, Archiv. Anat. Physiol.: 473, pl. xvii-xix: Venezuela; Lichtenstein and Martens, 1856, Nomencl. Rept. Amphib.: 36.

Ophistodelphia ovifera Ernst, 1877, Flora y Fauna de Ven. (Caracas): 281.

Nototrema oviferum Nieden, 1923, Das Tierreich. Anura I: 323; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 39, 44.

Hyla vogli Müller, L., 1938, Zool. Anz., *121*: 284.

4 (U.S.N.M. 121164-7) Colonia Tovar.

Description. Skull rugose; derm of head involved in cranial ossification; two transverse ridges on the occipital region and sometimes two spines on the supratympanic ridge; snout short,

rounded; tongue circular, about ¼ free and nicked behind; vomerine odontoids in two transverse groups between the small, round choanae; eye diameter equal to distance between eye and nostril; interorbital space much broader than an upper eyelid; canthus ridged, inclined downwards toward the front; loreal moderately oblique, concave, rugose; tympanum ½ the eye diameter; a fold that arises on the supratympanic ridge runs for a short distance posteriorly; one oval, inner metacarpal tubercle; first finger slightly shorter than second, free; other fingers with a short basal web; largest disks as large as, or larger than, the tympanum; tarsal fold slight or absent; toes taken in order from first to fifth exhibit the following phalanges free of web: 2, 1½, 1⅔ to 2, 3, 1½; heel of the adpressed hind limb extends to between eye and nostril. Skin above, shagreened; a pair of crescent-shaped folds on the posterior part of the body. Male with a large, subgular vocal pouch.

Color. Above, gray with scattered dark spots; usually a pair of dark lines that begin on the occipital "horns" and extend posteriorly to the dorsal folds; a series of black spots along the flanks and on the anterior and posterior parts of the thighs where they sometimes form crossbars; between the spots, the thighs are rose or salmon. Below, gray, darker on the throat (♂ ♂ ?).

Measurements. ♂ snout-vent 50; head breadth 20; head length 17; femur 28; tibia 28.

Additional Localities. Cerro Avila (U.C.V. 29); Hacienda Los Venados, Avila (Müller, L., 1938); Puerto Cabello (Licht. and Mart., 1856 [= Weinland?]); Venezuela (Nieden, 1923; Lutz, 1927 [= Weinland?]).

Range. The Coastal Range. ?Central America to N. Venezuela.

Remarks. U.C.V. 29 is very dark gray all over the body; the lateral spots are very obscure and the spots on the thighs form well defined crossbars. No reddish or salmon color is visible. The tympanum is ⅔ the eye diameter.

The Central American *Opisthodelphis ovifera* of Günther, 1858, should, according to Taylor, probably be referred to *Anotheca coronata* (Stejneger).

From the description it is evident that *Hyla vogli* Müller is a synonym of this species.

Gastrotheca williamsoni Gaige

Gastrotheca williamsoni Gaige, 1922, Occ. Papers Mus. Zool. U. Mich., no. 107: 1-3: San Esteban, Venezuela; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 40; Röhl, 1949, Fauna Descr. de Ven., ed., 2: 402, fig. 182.

1 (U.M.M.Z. 55559, type) San Esteban.

Description. Derm of head free from cranial ossification; snout rounded; tongue large, rounded, deeply notched behind; vomerine odontoids in two transverse groups between the choanae; eye diameter equal to distance between eye and nostril; canthus distinct, curved; loreal concave; tympanum obliquely oval, ¾ the eye diameter; a supratympanic fold to the shoulder; a strong fold between elbow and wrist; first finger as long as second; fingers taken in order from first to fourth exhibit the following phalanges free of web: all, 1⅞, 2¼, 2; a faint tarsal fold; a large, inner metatarsal tubercle; subarticular tubercles well developed; toes fully webbed, their disks slightly smaller than those of the fingers and as wide as the horizontal diameter of the tympanum; heel of the adpressed hind limb extends to between tympanum and eye. Skin above, shagreened; pouch opening almost square and attached across the anterior end so it is open to the pouch only on the sides.

Color. Above, reddish gray obscurely spotted with dusky; a darker spot on the back just behind the head; an angular, dark, light-edged mark in front of the pouch with the edge directed forwards, and another faint, angular mark in front of the anus and within the pouch opening; lower lip with indistinct, vertical bars; a row of tiny, dark-edged tubercles connecting the eyelids across the interorbital space; flanks light, with dark vertical bars which slant slightly forward; limbs banded with black; back of the thighs dark, with small, light spots. Throat yellowish; belly and lower surfaces of limbs greenish yellow.

Measurements. Snout-vent 53; head breadth 20; head length 17.5; femur 24; tibia 28.5.

Range. San Esteban.

Remarks. According to Gaige this specimen is closer to *G. longipes* Boulenger, from which it may be distinguished by the difference in coloration, shorter legs and greater webbing of fingers and toes.

The color notes above are taken from the original description, for when I examined the type most of the markings described had faded.

Nototheca pygmaea (Boettger)

Nototrema pygmaeum Boettger, 1893, Ber. Senckenb. Naturf. Ges.: 40: Puerto Cabello; Zool. Gart., *34*: 129.

1 (U.M.M.Z. 55698) Quebrada Grande, Sn. Esteban.

Description. Derm of head free from cranial ossification; snout

short, rounded; tongue broad, adherent and slightly nicked behind; vomerine odontoids in two small, very slightly oblique groups between the round choanae; eye diameter equal to distance between eye and nostril; interorbital space as broad as or a little broader than an upper eyelid; canthus moderate, curved; loreal little oblique, faintly concave; tympanum ⅓ the eye diameter; a short supratympanic fold; a rather flat, inner metacarpal tubercle; subarticular tubercles fairly prominent; fingers free; the first slightly longer than second; larger disks as or slightly larger than the tympanum; a row of tubercles along the tarsus; an oval, inner metatarsal tubercle but no outer; toes taken in order from first to fifth exhibit the following phalanges free of web: 2, 1¾ to 2, 1¾ to 2, 3½, 2; heel of the adpressed hind limb extends to between eye and nostril. Skin above, smooth, slightly shagreened on the head; female with a longitudinal fold that ends on the crevice-like opening of the breeding pouch posteriorly.

Color. Above, head and anterior part of the back carmine, with blackish spots and designs, one of which forms a posteriorly-pointing triangle between the eyes; sides of the head and throat with small, white flecks and dots; limbs with blackish crosslines; thighs gray, speckled with gray brown; tibiae of female carmine; feet gray. Below, yellowish, the throat and chin being of a weaker color; hind limbs speckled with gray brown (modified from Boettger). In preservation, specimens are more or less of a plain brown color.

Measurements. Snout-vent 23; head breadth 8.5; head length 8.5; femur 11.2; tibia 13.

Additional Localities. Rancho Grande (U.C.V. 20).

Range. The Coastal Range.

Remarks. Nototheca pygmaea can be distinguished from all Venezuelan *Hyla*, with the exception of *H. marahuaquensis*, by having the first finger longer than the second.

Bokerman (1950) has separated the *Gastrotheca* species with non-adherent head skin and longitudinally opened breeding pouch as the genus *Nototheca* (Genotype, *Coelonotus fissilis* Miranda Ribeiro). For the species whose breeding pouch opens through a supra-anal orifice, he preserves the name *Gastrotheca*, while for those "breeding pouch frogs" having the derm of the head involved in the cranial ossification he suggests the name *Fleetonotus* Miranda Ribeiro.

This arrangement will leave *Gastrotheca boliviana* in that

genus but the animals so far known as *G. pygmaca* and *G. fitzgeraldi*, will go into *Nototheca*, while *G. ovifera*, *G. helenae*, *G. nicefori* and probably *G. marsupiata* and *G. monticola* will be included in the genus *Flectonotus*. The latter two have ossified head skin, but the derm is not actually involved in the cranial ossification. *G. williamsoni* and *G. argenteoventris*, which have free cranial derm, do not have, however, a longitudinally opened pouch, so that they will be difficult to allocate under this arrangement.

Although recognizing the probability of a different origin for the frogs of the *G. pygmaca* group, and the convenience of separating them into another genus, I have preferred to maintain the other Venezuelan breeding pouch frogs in the genus *Gastrotheca*, until a more complete study of the "marsupial" frogs is made.

Nototheca fitzgeraldi (Parker) may prove to be conspecific with *N. pygmaca*. A specimen from Tobago at M.C.Z. (27784) carries five large eggs on its back.

Key to the Species of PHYLLOMEDUSA *Reported from Venezuela*

I. First and second toes equal ..... *bicolor*
II. First toe longer than second.
  A. Vomerine teeth present; parotids distinct; green above; spotted white on the flanks ..... *burmeisteri trinitatis*
  B. Vomerine teeth absent; parotids indistinct; purple above; striated on the flanks ..... *h. hypocondrialis*

PHYLLOMEDUSA BICOLOR (Boddaert)

Rana bicolore Boddaert, 1772, Epist. de Rana bicolore: 1, pl. iv, figs. 1-5: Surinam.

2 (U.P.R. 185-6) Sn. Fdo. de Atabapo.

Description. Head much broader than long; snout truncate; tongue entire, free behind; vomerine odontoids in two short, slightly oblique series between the large choanae; eye diameter shorter than distance between eye and nostril; interorbital space almost twice as broad as an upper eyelid; canthus angular; loreal straight, excavated; tympanum large, its posterodorsal margin hidden by the parotid, ¾ the eye diameter; parotid long, extending almost to the groin but much more prominent and distinct on the supratympanic region; a large oval, inner metacarpal tubercle; subarticular tubercles large; fingers free, with a slight but thick lateral edge; first finger shorter than second, which is shorter than fourth; disks large, about ⅔ the size of the tympanum; hind limbs feeble for the body size; no tarsal fold;

subarticular tubercles of toes large, rounded; a slight web between third and fourth toe; other toes free, with a thick lateral edge; first toe as long as the second, second shorter than fifth; disks of the first three toes smaller than the other two; heel of the adpressed hind limb extends to the shoulder; upper surfaces studded with bony deposits. Male with a brown rugosity on the inner side of the first digit but no apparent external vocal sac.

Color. Above, bright green (blue green in preserved specimens); posterior and anterior surfaces of thighs and inguinal region dirty white with purple reticulations or milky white, purple-edged spots; lower eyelid marked with purple-edged, white spots. Ventral surfaces of the body and limbs white; margin between the green upper and the white ventral color marked by purple-edged spots or by a white, purple-edged line on the fore limbs and distal segments of the hind limb; fingers white, except the last two, which might be particolored or with green spots; first three toes white, immaculate or with spots; outer two, green; disks of fingers and toes blue green, sometimes with white spots; lower lip with white, purple-edged elongated spots; a pair of white, purple-edged spots on the sides of the anal opening and two others on the breast, at the base of the forelimbs.

Measurements. Snout-vent ♂ 103, ♀ 112; head breadth ♂ 35.5, ♀ 39; head length ♂ 32, ♀ 33; femur ♂ 30, ♀ 31; tibia ♂ 36, ♀ 40.

Habits. The pair of specimens reported here were collected at night, during amplexus, on the ground, about 20 feet from a shallow pool. The voice is a trumpet-like "trrrbp."

Range. The Venezuelan Guayana. The Guianas to Perú.

Remarks. The two Venezuelan specimens have much smaller disks than either the Dutch Guiana or Peruvian individuals with which they have been compared; the first two toes seem to be also more reduced, the canthus more angular and the loreal region more vertical. There is also some difference in the markings between the upper and lower colors in the body of the Peruvian animal (M.C.Z. 4766).

Phyllomedusa burmeisteri trinitatis Mertens

Phyllomedusa trinitatis Mertens, 1926, Senckenbergiana, *8*: 145: Port of Spain.

3 (C.N.H.M. 29181-3) Urama.

Description. Head broader than long; snout subovoid, truncate

as seen from above; tongue oval, entire or nicked behind; vomerine odontoids in two short, slightly oblique and posteriorly convergent groups between the large, oval choanae; eye diameter equal or scarcely greater than distance between eye and nostril; interorbital space about 1½ times broader than an upper eyelid; canthus well defined, slightly curved; loreal slightly oblique, concave; tympanum ½ to ⅔ the eye diameter; parotid extending to the sacrum or farther back, but more prominent on the supratympanic region; an oval, well-defined inner metacarpal tubercle; subarticular tubercles large; fingers free; the first shorter than the second, which is shorter than the fourth; largest disk about ½ the size of the tympanum; a flat, oval, inner and a small indistinct outer metatarsal tubercle; toes free, with a thick lateral edge; first toe longer than second; disks of first three toes smaller than the others; heel of the adpressed hind limb extends to the posterior corner of the eye. Skin above studded with bony deposits on the posterior half. Male with a brown rugosity on the inner side of the first digit but no apparent external vocal sac.

Color. Above green, the flanks with white spots; ground color on the posterior part of the flanks purplish, with white spots; lower eyelids margined with white; lower lip distinctly margined with white; a transverse white line above the anus. Ventral surfaces of the throat, chest and limbs purplish, with a few white spots near the chest and thighs, a pair of white spots under the thighs on each side of the anus; limbs green above, yellowish or purplish beneath, the two colors separated on the posterior part of the humerus and tarsal segment by a definite purple-margined line; on the anterior part of the hind limb and also on the posterior part of the thighs and tibiae the green color changes to purple before assuming the yellowish color of the underparts; a series of white spots appear in this purple area from groin to inner toes; three inner toes white, sometimes with purplish spots, but only the disks of the two inner toes are white; three outer toes and also part of the fourth white, but the disk of the fourth is colored. A number of white spots at the base of the forearms.

Measurements. Snout-vent ♂ 65, ♀ 72; head breadth ♂ 22, ♀ 25; head length ♂ 20.5, ♀ 23; femur ♂ 30, ♀ 32; tibia ♂ 30.5, ♀ 34.

Localities. El Periquito (U.C.V. 90).

Range. The Coastal Range. The species extends from Trinidad to Argentina. The race is apparently limited to Trinidad, N. Venezuela, the Guianas and perhaps N. Brasil.

Remarks. Phyllomedusa burmeisteri burmeisteri from southern Brasil has very well defined and relatively large, white spots on the thighs, and some specimens are beautifully spotted with white on the throat. The specimens available to me for comparison (3) are considerably smaller than the Venezuelan and Trinidad specimens. One of the latter is 83 mm. long and the anterior and posterior parts of the thighs are purple, with whitish, very obscure spots.

Phyllomedusa hypocondrialis hypocondrialis (Daudin)

Hyla hypocondrialis Daudin, 1803, Hist. Rainette: 29 (*hypochondrialis* on pl. x, fig. 1); Surinam.

2 (U.P.R. 187-8) Pto. Ayacucho, vi.50.

Description. Snout short, truncate, slightly longer than the eye diameter; tongue narrow, entire and free behind; vomerine odontoids absent; eye diameter greater than distance between eye and nostril; interorbital space broader than an upper eyelid; canthus moderately angular, somewhat curved; loreal almost straight, concave; tympanum fairly distinct, its dorsoposterior margin hidden by the parotid; parotids indistinct; male with a brown rugosity in the inner side of the first digit; fingers free, the first shorter than the second, which is shorter than the fourth, fourth extending to the disk of the third; disks of the fingers about ⅔ the diameter of the tympanum; toes free; first toe much longer than second, fourth shorter than fifth; disks of the second and third toe smaller than the others; heel of the adpressed hind limb extends to the tympanum. Skin above smooth; underside of forearms granular. Male with a small external subgular vocal sac.

Color. Above and on the sides of the head, bluish purple; upper lip and flanks white, the latter with purplish, vertical bars; humerus white, with cross reticulations; forearm purplish; thighs white, with purplish crossbars and a longitudinal purplish brown stripe along its dorsal surface; tibial and tarsal segments purplish; concealed surfaces of the limbs with crossbars; ventral surfaces yellowish white.

Measurements. Snout-vent ♂ 36, ♀ 44; head breadth ♂ 12, ♀ 13.1; head length ♂ 11, ♀ 12.1; femur ♂ 10, ♀ 15; tibia ♂ 13, ♀ 16.

Habits. Collected at night in the tall grass of an inundated area. The female specimen is filled with very large, yellow eggs.

Range. The Venezuelan Guayana. British Guiana to N. Brasil. *Phyllomedusa hypocondrialis azurea* Cope is found in Paraguay and Argentina. It is easily distinguished from the northern form by its much smaller disks, which are not broader than the width of the fingers. Five Pernambuco specimens at the M.C.Z. seem to be intermediate in disk size. The race is not, however, recognized by Funkhouser (1957).

Remarks. The spelling *hypocondrialis* has been preferred to *hypochondrialis* not only because Daudin used it in the text of the original description but also because he repeated it in another paper (Hist. Rept., 1803b, *8*: 60).

CENTROLENIDAE

Key to the Species of Cochranella *Reported from Venezuela*

I. Fingers practically free, the first shorter than second; above, purple or bluish ..... *buckleyi*

II. Fingers webbed, the first equal or slightly longer than second; above, green (in life) or yellowish white.

A. Tympanum present; melanophores large and abundant ..... Species indeterminata

B. Typanum absent; melanophores not distinct ..... *fleishmanni*

Cochranella buckleyi (Boulenger)

Hylella buckleyi Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., ed. 2: 420, pl. xxv, fig. 5: E. Ecuador.

Centrolenella buckleyi Noble, 1920, Bull. Amer. Mus. Nat. Hist., *42*: 442.

1 (M.C.Z. 2526) Mérida.

Description. Snout semicircular, almost as long as the eye diameter; tongue rounded, about ½ free, nicked behind; vomerine odontoids absent; choanae small, round; interorbital space broader than an upper eyelid; canthus indistinct; loreal oblique, concave; tympanum indistinct; a fold from elbow to disk of fourth finger; a flat outer and a small, oval, inner metacarpal tubercle; subarticular tubercles flat; fingers depressed, practically free, the first shorter than second; disk of the fourth finger extending to the base of the disk of the third; disks large, truncate, larger than the tympanum; no humeral or tarsal folds; a flat inner metatarsal tubercle; toes taken in order from first to fifth exhibit the following phalanges free of web: 1⅔, 1¼, 1⅔, 3, 1¾; disks of the toes smaller than those of the fingers; heel of the adpressed hind limb extends to the nostril. Skin above, smooth.

Color. Above, bluish purple; a broad bluish purple band above the arm and another narrow one along the dorsal surface of the thigh, tibia and tarsus; remaining parts of the limbs yellowish. Ventral surfaces yellowish.

Measurements. ♀ Snout-vent 32.8; head breadth 11; head length 9; femur 16; tibia 17.

Range. The Venezuelan Andes and probably the Coastal Range. Eastern face of the Andes of Ecuador through Colombia to Venezuela.

Remarks. The specimen described here had been previously studied and dissected by Noble, who erroneously refers to this specimen as collected in Ecuador by Rosenberg (Noble, 1920: 442).

The genus *Centrolenella*, proposed by Noble (1920: 441) was found untenable by Dunn (1931: 399). Taylor (1951) on the basis of absence of vomerine teeth has proposed the name *Cochranella* for most of the species that were included under the name *Centrolenella* (the genotype was found to be a *Centrolene*).

Cochranella sp.

1 (M.C.Z. 28569) Temiche, Mt. Marahuaca, 4050 ft., v.50.

Description. Snout semicircular, more or less as long as the eye diameter; tongue round, mostly adherent and indistinctly nicked behind; vomerine odontoids absent; choanae round; interorbital space as broad as an upper eyelid; canthus very indistinct; loreal oblique, slightly concave; tympanum small and indistinct, about ⅓ the eye diameter; no humeral spine; first finger a little longer than second; outer two fingers webbed, the web leaving about two free phalanges on the third and 1⅞ on the fourth finger; a flat, inner metatarsal tubercle; toes taken in order from first to fifth exhibit the following phalanges free of web: 2, 1¼, 1, 2¼ to 2½, 1; heel of the adpressed hind limb extends to the nostril. Skin above, smooth.

Color. Above, green with yellow mottles (in life) or yellowish white and with a relatively great profusion of melanophores (alcohol after formalin); upper eyelid golden. Below, whitish.

Measurements. ♀ ? Snout-vent 20; head breadth 7; head length 6.5; femur 11; tibia 11.

Remarks. This form is very similar to *Cochranella fleishmanni* from which it is distinguished by the presence of a tympanum and by the great profusion of melanophores on the dorsal surface of body and limbs.

The animal was about to be named when, due to some unfortunate circumstance, the alcohol in the jar evaporated and the specimen dried out considerably. It was slightly restored with sodium triphosphate, but not sufficiently to bring out its original characters. Although there is a photograph of it, I prefer not to describe it as a species.

Cochranella fleishmanni (Boettger)

Hylella fleishmanni Boettger, 1893, Ber. Senckenb. Naturf. Ges.: 251: San José, Costa Rica.

2 (U.S.N.M. 117523-4) Los Canales.
5 (U.S.N.M. 128789-93) R. Chacaíto, viii, ix.38-39.
3 (U.S.N.M. 128796-8) Los Canales.
1 (U.S.N.M. 128800) Colonia Tovar, i.39.
1 (U.S.N.M. 128801) Camino de Galipán, R. Cotiza, iii.39.

Description. Snout semicircular, equal to the eye diameter; tongue rounded, ⅓ free and slightly nicked behind; vomerine odontoids absent; choanae small and round; interorbital space slightly broader than an upper eyelid; canthus absent or very indistinct; loreal oblique, not concave; tympanum hidden; no humeral spine; first finger more or less equal to second; only two outer fingers webbed, the web leaving two free phalanges on the third and 1½ to 1⅞ on the fourth finger; fingers flat, disks truncate; a small inner metatarsal tubercle; toes taken in order from first to fifth exhibit the following phalanges free of web: 1½, 1, 1½, 2½, 1½; heel of the adpressed hind limb extends to between eye and nostril. Skin above, slightly shagreened.

Color. Yellowish white throughout; no apparent chromatophores; eyelids white.

Measurements. Snout-vent 25; head breadth 9; head length 7.5; femur 13.5; tibia 13.

Range. The Coastal Range and probably the lower Andean slopes. Central America to Venezuela. Dr. Dunn informed me that the species has been collected at the eastern base of the Andes of Colombia.

Remarks. In some specimens the tongue is entire and in one the heel reaches the tip of the snout.

DENDROBATIDAE

Key to the Genera of Dendrobatidae Reported from Venezuela

I. Upper jaw toothed.
  A. Toes webbed; ground color generally black or gray . . . . *Prostherapis*

B. Toes free or with a rudiment of web; ground color generally brown or tan ..... *Phyllobates*

II. Upper jaw toothless.

A. Toes webless ..... *Dendrobates*

Key to the Species of Prostherapis *Reported from Venezuela*

I. Toes ½ webbed or more (not more than two free phalanges on the fifth and third and 1½ on the second toe).

A. Toes not fully webbed.

1. A black band across the chest ..... *collaris*
2. No black band across the chest ..... *shrevei*

B. Toes fully webbed, with the exception of the fourth; above spotted with white; no dark band across the chest ..... *dunni*

II. Toes not more than ⅓ webbed.

A. A black band across the chest.[1]

1. Lower surface of dorsolateral band ending anteriorly at the corner of the eye; orbito-tympanic space white or whitish; loreal region usually with dark scribblings; chest band broad and well defined ..... *t. trinitatis*
2. Lower surface of dorsolateral band ending anteriorly at or near the lower margin of the eye; orbitotympanic space black; loreal region usually of uniform white color; chest band usually narrow and ill defined (♂ ♂) ..... *neblina*

B. No black band across the chest.

1. Snout short and rounded; first finger shorter than second; most or all of the ventral surfaces dark, with white dots ..... *alboguttatus*
2. Snout truncate; first finger shorter than second; above, greenish silvery with an irregular vertebral and two lateral bands; ventral surfaces light with obscure darker spots ..... *trinitatis mandelorum*

Prostherapis collaris (Boulenger)

Phyllobates trinitatis Boulenger, 1903, Ann. Mag. Nat. Hist., (7) *11*: 482.

Hylixalus collaris Boulenger, 1912, Ann. Mag. Nat. Hist., (8) *10*: 190: Mérida, 5,200 ft. and Río Albarregas, 11,300 ft.

Hyloxalus collaris Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 40.

3 (M.C.Z. 3887, 10723-4) Río Albarregas, Mérida.
8 (U.M.M.Z. 58909) Río Albarregas, Mérida.
1 (U.M.M.Z. 51267) Río Albarregas, nr. Mérida.
2 (C.N.H.M. 3558-9) Río Albarregas, Mérida.
1 (U.S.N.M. 118678) Mérida.
4 (A.M.N.H. 10512-15) Río Albarregas, nr. Mérida.
3 (A.M.N.H. 10690, 10695-6) Mérida.

[1] May be absent in occasional specimens of *P. t. trinitatis* or *P. neblina*.

Description. Snout subovoid, not truncate; tongue oval or spatulate, free, entire or slightly emarginate behind; eye diameter greater than distance between eye and nostril but a little shorter than the snout; interorbital space broader than an upper eyelid; canthus rounded; loreal almost straight, slightly concave, if at all; tympanum indistinct or hidden, about ½ the eye diameter; two flat, not distinct, metacarpal tubercles; fingers free, the first shorter than second; an oblique, distinct tarsal fold; two small metatarsal tubercles; toes taken in order from first to fifth exhibit the following phalanges free of web: 1½, 1½, 2, 3½ to 3¾, 2; the web extends to the disks as distinct lateral fringes; heel of the adpressed hind limb extends to the eye. Skin above and below, smooth.

Color. Above and on the sides of the head and body grayish brown; loreal region probably lighter than rest of the head; flanks sometimes with white spots in and near the groins. Ventral surfaces yellowish white, with some infuscation on the limbs and a broad brown band across the chest; posterior part of the thighs obscurely marbled with light.

Measurements. Snout-vent ♂ 27, ♀ 32; head breadth ♂ 10, ♀ 12; head length ♂ 9, ♀ 10.5; femur ♂ 12, ♀ 15; tibia ♂ 12.5, ♀ 15.

Range. The subtropical zone and above in the Mérida Andes.

Remarks. In 1940 Hellmich "corrected" Boulenger's description of *Prostherapis collaris* on the basis of differences found between his 656 specimens and the original description. All his specimens were from the Coastal Range where *P. collaris* does not exist, an indication that what he had were *P. trinitatis trinitatis.*

Prostherapis shrevei sp. n.

Type. Museum of Comparative Zoology No. 28567, a ♂ from Mt. Marahuaea, 5000-6000 ft. Coll. J. A. Rivero, May 1950.

Diagnosis. A *Prostherapis* with truncate snout, tympanum present, first finger shorter than second, a short tarsal fold, toes exhibiting the following phalanges free of web: 1, 1, 1½, 3¾, 1¾; brown dorsal color, having one interorbital, one or two scapular, two sacral and one preanal dark spots and crossbarred limbs.

Description. Snout truncate; tongue narrow, indistinctly nicked behind; eye diameter greater than distance between eye and nostril, almost as long as the snout; interorbital space broader

than an upper eyelid; canthus angular; loreal vertical, not concave; tympanum not very distinct, ½ the eye diameter, dorsally hidden by a flat skin fold; a flat, round, outer and a smaller, oval, inner metacarpal tubercle; first finger shorter than second; subarticular tubercles oval, not very prominent; disks smaller than the tympanum; a short but distinct fold at the distal half of the tarsus; metatarsal tubercles small, the outer round, the inner elongated and more prominent; toes taken in order from first to fifth exhibit the following phalanges free of web: 1¼, 1¼, 2¼, 3¼, 1⅔; web extended to the disks as distinct lateral fringes; heel of the adpressed hind limb extends to the anterior corner of the eye. Skin above, smooth, somewhat rugose behind the eyes and on the flanks. Belly finely granular under a lens.

Color. Above, dark brown with an interorbital spot, another dark spot on the scapular region, two others in front of the sacrum and a single one behind these; a number of white, radiating lines from lower eyelid to upper lip; one of these extends posteriorly to the shoulder; flanks very dark brown, with white spots that sometimes fuse with the ventral color; a line of white dots from groin to about middle of the flank; limbs crossbarred, the bars being oblique and very distinct on the thighs; fingers and toes barred brown and white. Below, pure white.

Measurements. ♂ Snout-vent 21.5; head breadth 8; head length 8; femur 10.5; tibia 11.

Habits. Collected in the proximity of streams or on stones within streams.

Remarks. Except for specimen No. U.P.R. 232, the paratypes are not in very good condition and U.P.R. 234 and 235 are juveniles.

U.P.R. 140, Mt. Marahuaca, 5000-6000 ft. Coll. J. A. Rivero, May 1950. Snout-vent 30.5; head breadth 7; head length 7; femur 10; tibia 11. Very similar to type in all respects but the snout is shorter and blunter, probably because it has received a blow from the front. Toes exhibiting the following phalanges free of web: 1½, 1½, 2, 3½, 1¾.

U.P.R. 232, ♀, Mt. Marahuaca, 5000-6000 ft. Coll. J. A. Rivero, May 1950. Snout-vent 36; head breadth 9; head length 9; femur 12.5; tibia 12. Toes exhibiting the following phalanges free of web: 1½, 1½, 2½, 3, 1½. Almost solid brown above, the scapular and sacral spots, the loreal bars and the crossbars of the limbs being very obscure. Throat, chest and anterior part of the belly with peculiar chocolate spotting or speckling.

U.P.R. 233, ♂ ?, Mt. Marahuaca, 5000-6000 ft. Coll. J. A. Rivero, May 1950. Snout-vent 20; head breadth 7.5; head length 7; femur 11; tibia 11.5. Toes exhibiting the following phalanges free of web: 1½, 1½, 2, 3, 2½. Dark brown above; spots obscure; venter with brown mottling on the throat, chest and anterior part of the belly.

U.P.R. 234-5, Mt. Marahuaca, 5000-6000 ft. Juvenile specimens agreeing in all characters with the type.

U.P.R. 236, Mt. Duida, about 1500-2000 ft. Coll. J. A. Rivero, May 1950. Snout-vent 17.5; head breadth 6.5; head length 6; femur 8; tibia 9. Except for its lighter loreal region and smaller size, this Mt. Duida specimen is almost identical with the type from Marahuaca.

This species agrees best with *Prostherapis bocagei* (Espada) of which it is perhaps a race. It differs from this form in its slightly less webbed toes, more slender build, distinct crossbanding of the limbs and in its apparently persistent dark spotting above. Spotting may also occur in *P. bocagei* but it does not show the same pattern in this species as in *P. shrevei*. Apparently, *Prostherapis shrevei* represents another high altitude, Guayanan frog with Andean relationships.

The species is named after Mr. Benjamin Shreve of the Museum of Comparative Zoology.

Prostherapis dunni sp. n.

Type. Chicago Natural History Museum No. 35987, a ♀ from above Caracas, D. F. Coll. Padre Cornelio Vogl, 1940.

Diagnosis. A *Prostherapis* with a short rounded snout, equal to the eye diameter; first finger shorter than second; fully webbed toes; dorsum spotted with white; hind limbs banded with brown and yellow.

Description. Snout short, subtriangular but with a blunt tip; tongue small, oval, entire and free behind; eye diameter as long as the snout; interorbital space slightly broader than an upper eyelid; canthus angular; loreal vertical, not concave; tympanum not very distinct, ⅓ the eye diameter; two metacarpal tubercles; first finger shorter than second; disks relatively large, short; an indistinct, oblique tarsal fold; two small metatarsal tubercles; subarticular tubercles of fingers and toes small; toes fully webbed with the exception of the fourth, which has two phalanges free; heel of the adpressed hind limb extends to the anterior corner of the eye. Skin above and below, smooth.

Color. Above, brown with whitish and yellowish spots of irregular size and form; a dark brown band that begins at the posterior corner of the eye continues for a short distance posteriorly and then merges with rest of the body color; loreal region below the level of the nostrils light with dark scribblings; a light line extends from anterior corner of the eye, around the tip of the snout, to the other eye; another whitish, ill-defined line crosses the tympanic disk and extends to the shoulder; a relatively broad, irregularly margined line from groin toward shoulder; posterior part of the thighs with an irregularly margined, longitudinal, yellow band; thighs above, and rest of the limbs, with distinct brown crossbands that are separated by yellow areas. Throat yellowish, with some slight infuscation on the margins of the jaw; belly white; hind limbs yellow.

Measurements. ♀ Snout-vent 24; head breadth 8; head length 8; femur 13; tibia 12.5.

Remarks. The 8 paratypes (C.N.H.M. 67379-67384) have the same data as the type and differ from it only in minor details. No. 67379 is a male, with the following measurements: snout-vent 20; head breadth 7.5; head length 8; femur 11; tibia 11. The largest specimen is No. 67384 with 25 mm. in snout-vent length and the smallest, No. 67380 with 18 mm. In some specimens there is more yellow and less brown on the thighs as compared with the type while in others the dorsal spots are larger and the crossbars on the limbs better defined.

This peculiar *Prostherapis* does not have any close relative in Venezuela. *Prostherapis alboguttatus* from the Mérida Andes has a more rounded snout, much less webbing and different ventral and dorsal coloration.

Prostherapis trinitatis trinitatis (Garman)

Phyllobates trinitatis Garman, 1887, Bull. Essex Inst., *19*: 13: Trinidad; Stejneger, 1902, Proc. U.S. Nat. Mus., *24*: 179; Lutz, A., Mem. Inst. Osw. Cruz, *20*: 40, 46; Schmidt, K. P., 1932, Zool. Ser. Field Mus. Nat. Hist., *18*: 160; Shreve, 1947, Bull. Mus. Comp. Zool., *99*: 537; Alemán, 1952, Mem. Soc. Cienc. Nat. LaSalle, *12*: 29, fig. 3.

Prostherapis herminae Boettger, 1893, Ber. Senckenb. Naturf. Ges.: 37.

Hyloxalus collaris Hellmich, 1940, Bol. Soc. Ven. Cienc. Nat., *6*: 318; Zool. Anz., *131*: 119.

6 (M.C.Z. 26147-9 + 3 dupl.) Cerro Cosme.

Description. Snout short, truncate; tongue oval, free and slightly nicked behind; eye diameter longer than distance between eye and nostril but shorter than the snout; interorbital

space broader than an upper eyelid; canthus angular; loreal vertical, on occasions slightly concave; tympanum ½ the eye diameter, its posterodorsal margin concealed under a skin fold; metacarpal tubercles indistinct; fingers free, their disks smaller than the tympanum; first finger slightly shorter or equal to second; a short oblique fold at the distal half of the tarsus, metatarsal tubercles small; two inner toes with a rudiment of web, the others with the following phalanges free of web: 2, 3, all; heel of the adpressed hind limb extends to the middle of the eye or between eye and nostril. Skin above, smooth or tubercular; usually tubercular beyond the sacrum; ventral surfaces smooth.

Color. Above, dark grayish brown; loreal region light with dark scribblings; humerus with an anterior dark longitudinal line; a white lateral line from groin to about the middle of the flank; other white dots are usually present on the flanks; posterior part of the thighs obscurely marbled; hind limbs indistinctly crossbarred. Ventral surfaces white with a distinct, but narrow, brown band across the chest.

Measurements. Snout-vent ♂ 23, ♀ 26; head breadth ♂ 8, ♀ 9; head length ♂ 7.5, ♀ 9; femur ♂ 11, ♀ 11; tibia ♂ 11.5, ♀ 12.5.

Additional Localities. Baruta (Alemán, 1952); Camino de Galipán, R. Cotiza (U.S.N.M. 128782-3); Caracas (Hellmich, 1940); Cerro Avila (U.C.V. 96-8, 2016-7); Colonia Tovar (U.S.N.M. 128781, 117540, 121135-43); Cordillera Padre Vogl (Hellmich, 1940); Cueva del Guácharo (U.C.V. 1); La Guaira (U.S.N.M. 27792 [= Stejneger, 1902]); Laguna de Valencia (Hellmich, 1940); Los Canales (U.S.N.M. 128900, 128777-80); Macuto (C.N.H.M. 5650); Maracay (Lutz, 1927); Pie de Avila (U.C.V. 109, 111); Pie del Cerro (U.S.N.M. 121144-5); Puerto Cabello (Boettger, 1893); Rancho Grande (M.C.Z. 26953-9; U.C.V. 23-27, 39-40, 63, 70-5, 84); Río Chacaíto (U.S.N.M. 117538-9); Sn. Esteban (U.M.M.Z. 55687-9, 55546-9 [6]); Sn. Julián (U.S.N.M. 27808 [= Stejneger, 1902]); Turgua (Alemán, 1952); Mt. Turumiquire 17790 [10 = Schmidt, 1952]).

Range. The Coastal Range and the northeastern Falcón Region. Trinidad.

Remarks. The specimens described differ from other Venezuelan material and from the cotypes in their larger, stouter body, longer and more truncate snout, distinctly tubercular dorsal surfaces (irrespective of sex) and brown coloration in which the dark lateral band is not generally distinguishable.

There seems to be considerable variation in *Prostherapis t. trinitatis* in general and this has led to the inclusion within the species of several sibling forms that probably deserve specific distinction. Dr. Test has just detected one such case in his *P. neblina,* but others may be found.

M.C.Z. 26959 and less distinctly C.N.H.M. 5650 are all black above and below, the first only having a whitish area on the ventral aspect between the thighs and under the tibiae. In M.C.Z. 26953-8 the limbs are much lighter than the body color and the thighs are very distinctly crossbarred, the bars being separated by very light areas. The two Pie de Avila individuals have a pair of light bands extending backwards from behind the eyes. Although present in many *P. t. trinitatis* these bands are much more distinct and striking in the two Avila specimens as they continue inwards on the sides of the dorsum.

U.C.V. 2016 and 2017 from Cerro Avila are of enormous size (32.5 and 30.5 mm.) and have white spots on the dorsal surfaces and a broader, less tapering snout. U.C.V. 96, 98 and 109 represent this same form.

Three males carrying tadpoles on their backs have been examined. In every instance the adult frog is a much lighter gray than is normal for *P. t. trinitatis.* U.C.V. 74, also of very light grayish color, is probably a male that has recently shed its load of tadpoles.

Prostherapis trinitatis mandelorum (Schmidt)

Phyllobates mandelorum Schmidt, K. P., 1932, Zool. Ser. Field Mus. Nat. Hist., *18*: 160: Mt. Turumiquire, 8,000 ft., Venezuela.

2 (C.N.H.M. 17788-9, type + paratype) Mt. Turumiquire, 8000 ft.

Description (from original). Distinguished from the typical species by its dorsal and ventral coloration. The dorsum, including the top of the head is greenish silvery, sharply distinct from the chocolate colored sides; a dark irregular vertebral band of the same color as the sides begins with an expansion between the eyes and extends nearly to the hind limbs; this band widens and encloses a light spot opposite the shoulders; the dark color of the sides extends around the snout; a silvery band on the upper jaw connects with the same color on the upper arm; border of upper jaw dark; a light line extends forward from the groin in the dark lateral band, which is not reached by the broad dark bars of the upper and posterior surfaces; tibia barred.

Ventral surfaces light with obscure darker spots; chest without trace of transverse dark band.

Measurements. Snout-vent 26; head breadth 8.5; head length 8.5; femur 12; tibia 11.5.

Range. Mt. Turumiquire.

Remarks. The type of *P. t. mandelorum* has a striking similarity to some of the cotypes of *P. t. trinitatis.* In some of the latter the chest band is very extensive and does not really form a band, while in others it is not very distinct. The similarity is, of course, to be expected as Mt. Turumiquire is relatively close to the type locality of *P. t. trinitatis.*

Prostherapis neblina Test

Prostherapis neblina Test, 1956, Occ. Pap. Mus. Zool. Univ. Mich., No. 577: 2: Portachuelo Pass, Rancho Grande.

2 (U.M.M.Z. 103011, 103014) Portachuelo Pass, Rancho Grande, 900-1100 m., 51.

Description. Snout short, truncate; tongue pyriform, ½ free and nicked behind; eye diameter as long as the snout; interorbital space as broad as an upper eyelid; canthus angular; loreal vertical; tympanum ½ the eye diameter, its posterodorsal margin concealed under a skin fold; a round, prominent palmar and a smaller, oval, inner metacarpal tubercle; fingers free; first finger equal to second when adpressed in the middle; disks smaller than the tympanum; a distinct, oblique tarsal fold; metatarsal tubercles small but prominent and distinct; subarticular tubercles rounded; toes with a short basal web; taken in order from first to fifth, with the following phalanges free of web: 2, 2, 3, practically all, practically all; the web continues to the disks as conspicuous lateral fringes; disks of toes approximately the same size as that of the tympanum; heel of the adpressed hind limb extends to between eye and nostril. Skin above, smooth or slightly shagreened, occasionally with sparse tubercles, or more closely set ones behind the sacral region.

Color. Grayish brown, with two dark brown lateral bands from tip of the snout to inguinal region; behind the eye, the lower margin of the band starts at about 7:00 o'clock (considering the eyeball as a clock face) so that all the space between tympanum and eye is of a dark color and the tympanum falls within the dark area, only its lower margin touching the white upper lip; lower section of the loreal region below the nostril and to approximately 4:00 o'clock on the right side of the eyeball,

white, with a slight infuscation but no markings or reticulations of any sort; the white color continues posteriorly below the eye and tympanum to the forearm; a light colored line above the brown lateral band from upper eyelid to lumbar area; a white line extending anteriorly within the dark band from groin, to about halfway on the flanks; an oblique, wedge-shaped bar on the anterior side of the forearm; limbs crossbanded, the bands diffusing and forming reticulations on the posterior aspect of the thighs. Below, white, immaculate, except for a narrow dark band across the anterior part of the chest.

Measurements. Snout-vent 26.8; head length 9.3; head breadth 9.2; femur 9.2; tibia 12.8.

Habits. P. neblina is an inhabitant of humid slopes. Its voice consists of a series of short trills, while that of *P. trinitatis,* a frog of small streams is a series of clearly defined single notes. Upon being approached, *P. trinitatis* moves hurriedly away, while *P. neblina* permits close approximation and then moves away with short hops (Test, *op. cit.*).

Range. Definitely known only from the type locality. U.C.V. 21, 22 and 34, included under *P. trinitatis trinitatis* (see "Localities" under that species) may be referable to this form. Unfortunately, they were available for examination only before *P. neblina* was described.

Remarks. According to Test, the variation in this species is small, although males tend to have narrower chest bands (sometimes scarcely indicated) and more infuscation of the light areas. The dorsal surfaces may be uniform blackish or with faintly indicated mottles, and the lateral whitish line may be of variable forward extent. In some specimens the lateral black area is interrupted by whitish mottling and the dark bars of the limbs may be equally broken by mottling or freckling.

Living *P. neblina* can be easily distinguished from *P. trinitatis trinitatis,* by the yellow ventral surfaces of the legs and to a lesser extent of the body, and by the uniformly dark brown back margined by the tan (whitish in alcohol) dorsolateral stripes (Test, *op cit.*). Alcoholic specimens are much more difficult to distinguish. In *P. neblina* the tympanum and the space between tympanum and eye are enclosed within the black area of the lateral band, while in *P. t. trinitatis,* the lower parts of tympanum and orbito-tympanic space are white. *P. neblina* is also said to have a less constant and conspicuous chest bar, more uniformly

colored (white) upper lip, more uniform dorsal color, more distinct dorsolateral stripes, a larger size, narrower head and more prominently banded limbs. However, many good *P. t. trinitatis* have very distinctly banded limbs.

It is possible that some of Hellmich's *P. trinitatis* material (see synonymy of that species) may have included *P. neblina*, although the ventral surfaces are described as gray, with throat, anterior chest and sides of the belly dark blue gray. Lutz, 1927, describes the females of his specimens of *P. trinitatis* as having orange ventral surfaces, an indication that he may have had the two species.

Prostherapis alboguttatus (Boulenger)

Phyllobates alboguttatus Boulenger, 1903, Ann. Mag. Nat. Hist., (7) *11*: 482: Mérida, 1600 m.; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 40, 47.

5 (U.M.M.Z. 58904) Mérida.
1 (U.M.M.Z. 51266) Mérida.
2 (C.N.H.M. 3661-2) Mérida.
3 (A.M.N.H. 10551-53) La Culata, 3,000 m.
8 (A.M.N.H. 644, 646-8, 649-51, 3137) Mérida.

Description. Snout short, rounded; nostrils more or less equidistant between eye and tip of the snout; tongue oval, free, entire or faintly nicked behind; interorbital space broader than an upper eyelid; canthus rounded or bluntly angular; loreal almost vertical, not concave; tympanum indistinct, ½ to ⅔ the eye diameter; a large rounded outer and a small oval, inner metacarpal tubercle; subarticular tubercles rounded, not prominent; fingers free, the first extending to the disk of the second; larger disks smaller than the tympanum; two small metatarsal tubercles; first four toes with a short basal web that extends as lateral fringes to the disks, outer toe practically free; heel of the adpressed hind limb extends to the eye. Skin above and below, smooth.

Color. Above, brownish gray with obscure darker markings and two broad, dark brown, lateral bands that extend from the tip of snout to inguinal region; above these there is apparently a light line from behind the eyelids backwards; flanks dotted with white; hindlimbs spotted or crossbanded; throat, breast and anterior part of the belly brown, dotted with white; posterior part of the belly and thighs generally white.

Measurements. Snout-vent ♂ 25, ♀ 26.5; head breadth ♂ 9.5, ♀ 10; head length ♂ 8, ♀ 9; femur ♂ 11, ♀ 11.5; tibia ♂ 11, ♀ 11.5.

Range. The subtropical zone and above in the Mérida Andes.

Remarks. In some specimens the brown ventral color is restricted to the pectoral region and a transverse bar similar to the one that occurs in *P. trinitatis* and *P. collaris* is formed. Apparently this is pure coincidence and does not indicate close relationship between these forms.

On some of the specimens all the ventral surfaces are dark brown, distinctly dotted with white. On the dorsal surface, however, the spots described by Boulenger were not detected in any specimen.

Prostherapis alboguttatus can be easily distinguished from *P. trinitatis* by its rounded, not truncate snout, nostril equidistant between eye and tip of the snout (in some specimens they are slightly closer to the eye), and different coloration.

Key to the Species of PHYLLOBATES *Reported from Venezuela*

I. Third and fifth toes equal, no tarsal tubercle or fold; tympanum distinct ..... *bromelicola*

II. Third and fifth toes subequal; a tarsal fold; tympanum indistinct, almost hidden; usually with a chain of diamond shaped markings above ..... *brunneus*

PHYLLOBATES BROMELICOLA Test

Figure 12

Phyllobates bromelicola Test, 1956, Occ. Pap. Mus. Zool. Univ. Mich., No. 577: 6: Pico Periquito, Rancho Grande, 1375 m.

1 (U.M.M.Z. 113029, paratype) Pico Periquito, Rancho Grande, 1310 m.

Description. Snout short, truncate; tongue pyriform, half free, nicked behind; eye diameter greater than distance between eye and nostril but slightly shorter than snout; interorbital space little broader than upper eyelid; canthus angular; loreal vertical; tympanum distinct, ½ the eye diameter; two metacarpal tubercles, the outer divided and more extensive than the inner; subarticular tubercles indistinct, except in the first finger, where the only tubercle is rounded and slightly prominent; first finger considerably shorter than second, which is slightly shorter than fourth; larger disks smaller than the tympanum; two small metatarsal tubercles; toes free, their disks as large as those of the fingers; last toe feeble, shorter than third, and having the smallest disk of all; heel of the adpressed hind limb extends to the anterior corner of the eye. Skin above, smooth. Below, feebly granular on the throat, belly and thighs.

Color. Above, light yellowish brown or tan with considerable darker dusting (contracted melanophores); a dark brown canthal streak beginning at the tip of the snout and continuing posteriorly to the lumbar region; on the flanks the stripe diffuses ventrally and near the groin it narrows to a broad line that extends almost to the tip of the urostyle; a narrow white line above the brown band, from tip of snout, through margin of

Fig. 12. *Phyllobates bromelicola* Test. Paratype U.M.M.Z. 113029.

upper eyelid, to end of the brown band; loreal region below the lateral band and upper lip immaculate; two distinct, short, oblique bars on the proximal end of the thigh, the distal one extending anteriorly to the anterior aspect; another short bar on the middle of the tibia and other dusky, ill-defined ones on the ventral aspect of the tarsus and foot. Below, whitish, immaculate.

Measurements. ♂, snout-vent 14.7; head length 5; head breadth 4.2; femur 7; tibia 7.

Habits. As its name implies, *P. bromelicola* lives and apparently breeds in bromeliads, and was never found by its author outside of the "tree pines."

Range. Only known from the upper slopes of Pico Periquito.

Remarks. In life, the color of the species is described as follows: "ground color of the dorsum is olive, bordered by a distinct white hairline; lateral band black; bars on thighs and shank black; tips of digits black; underparts bright yellow throughout . . ." (Test, *op. cit.*).

Superficially, *P. bromelicola* looks a lot like *P. nubicola flotator* Dunn, but in the latter species the first finger is longer than the second; the white dorsolateral line enters into and divides the lateral dark band at its posterior end, and the thighs do not have oblique bars on the upper surfaces. The enlarged third finger of the male *P. nubicola* has not been described for *P. bromelicola*.

Phyllobates brunneus (Cope)

Prostherapis brunneus Cope, 1887, Proc. Amer. Philos. Soc., *24*: 54: Matto Grosso.

Prostherapis trinitatis Boettger, 1896, Ber. Senckenb. Naturf. Ges., 1895-6: LIV.

3 (U.M.M.Z. 113885:AB4464, 4497, 4842) nr. La Cumbre, Maracay-Turiano Rd.

1 (U.M.M.Z. 55548) Boquerón, Yaracuy.

Description. Snout truncate; tongue narrow, free, entire or slightly nicked behind; eye diameter slightly greater than distance between eye and nostril but shorter than the snout; interorbital space slightly greater than an upper eyelid; canthus angular; loreal vertical; tympanum indistinct, almost totally hidden, only the anteroventral margin showing, about ½ the eye diameter; metacarpal tubercles small but distinct; subarticular tubercles rounded, distinct; first finger longer than second when adpressed in the middle, second longer than fourth; a short, oblique tarsal fold; metatarsal tubercles small, the inner elongated, the outer conical; a short basal web between toes 2 and 3 and 3 and 4; disks of toes larger than those of the fingers; heel of the adpressed hind limb extends to the eye. Skin above, smooth, with scattered tubercles at the posterior end, slightly rugose on the flanks. Below, smooth.

Color. Above, light yellowish brown or tan with a central, darker longitudinal band that widens and narrows a number of times and sometimes breaks into dots or scribblings at the sides; a broad, dark brown lateral band from tip of snout to groin; above this a whitish narrow line from behind the upper eyelid to groin; upper lip white; a dusky wedge-shaped bar at the anterior aspect of the forearm; no distinct white line on the flanks, within the brown lateral band; limbs cross-barred. Below, whitish, immaculate.

Measurements. Snout-vent ♂ 18, ♀ 18.5; head length ♂ 6, ♀ 6.5; head breadth ♂ 6, ♀ 6; femur ♂ 8.2, ♀ 8.2; tibia ♂ 8, ♀ 8.5.

Habits. A ground species inhabiting humid slopes (Test, 1956: 6).

Additional Localities. Mt. Marahuaca, 5000 ft. (U.P.R. 229-31, 250); La Culebra, 1000 ft. (U.P.R. 251); Alto Orinoco (Boettger, 1896); Río Guainía, Alto Orinoco (Senekenb. Mus. 7285 = Boettger, 1896).

Range. The Coastal Range and the Venezuelan Guayana. N. Colombia and British Guiana to Río de Janeiro.

Remarks. The tympanum in the Venezuelan examples is indistinct and almost hidden, but not totally concealed as described for the type specimen. The first finger is also described as equal to second and that is the way it looks if it is moved towards the second, but if both are adpressed in the middle of the two, the first appears longer. It also appears longer when the fingers are naturally separated.

The Coastal Range *Phyllobates brunneus* agrees with the description of *Phyllobates marchesianus* Melin in practically every respect. The dorsal longitudinal band of *brunneus* is not described for *marchesianus,* which is said to be brownish above, with indistinct black spots, but on the other hand, they both agree in having the first finger longer than the second (see above), a similar basic color, and in lacking a white line from groin to middle of flank. The two forms may prove to be conspecific.

U.P.R. 229-31, 250, 251 were originally referred to *P. marchesianus* and then to *P. brunneus* when no good characters were found to differentiate them from this species, except perhaps the longer first finger and the presence of an indistinct tympanum. As other specimens with typical *brunneus* coloration have a tympanum and a longer first finger, it was tentatively concluded that Cope's statement that the first finger is equal to the second in the type of *brunneus* may have resulted from his adpressing the first finger to the second in the position of the latter. instead of having them meet in the middle of the two. Regarding the tympanum, U.P.R. 251 has it definitely concealed while all the other specimens have it somewhat exposed.

In most of the U.P.R. specimens the "dorsal chain of diamonds" is not evident, and there is no whitish dorsolateral line in any. The latter may be the result of having the specimens for a few weeks in formalin after they were collected. However, they may not have had the line at any time. Their toe disks are also bigger than those from the Coastal Range material.

Melin, 1941, expressed doubt in allocating his slightly webbed *marchesianus* to a genus, and ended up by calling it *Phyllobates? marchesianus*. Unless different habits and habitats justify the separation, the division into the genera *Prostherapis* and *Phyllobates* should be reconsidered in the light of the more recently described forms. The division on the basis of presence or absence of web seems now untenable.

Dendrobates leucomelas Steindachner

Dendrobates leucomelas Steindachner, 1864, Batrachol. Mittheil.: pl. xiii, figs. 1a-d: Colombia.

Dendrobates tinctorius Boettger, 1896, Ber. Senckenb. Naturf. Ges.: LIV.

7 (U.P.R. 198-204) La Culebra, 1000 ft., iv.50.

1 (U.P.R. 205) Base Mt. Duida, 2000 ft. approx., vi.50.

2 (U.P.R. 206-7) Tapara, iv.50.

Description. Snout truncate; tongue narrow, entire and free; eye diameter equal to distance between eye and nostril; interorbital space flat, broader than an upper eyelid; canthus angular but not sharp; loreal slightly inclined inwards, not concave; tympanum moderate, its posterior margin somewhat hidden under a flat, indistinct fold that runs to the shoulder, about ⅔ the eye diameter; a large central metacarpal tubercle; subarticular tubercles round, moderate; fingers free, the first shorter than second; disks large, truncate and with converging margins; disk of the first toe distinctly smaller than the others; a short, oblique tarsal fold may be present or absent; two moderate metatarsal tubercles; toes free, their disks much smaller than those of fingers; heel of the adpressed hind limb extends to the tympanum. Skin above, smooth. Beneath, smooth on the throat and breast, slightly rugose on the belly and thighs.

Color. Above, bright yellow (in life), usually with a broad, black transverse band across the scapular region and another across the sacral region; the yellow spaces between the bands may have narrower bands or rounded or elongated black spots; limbs yellow, spotted with black; a black transverse band across the distal end of the tibia seems to be constant; posterior part of the thighs black, the color extending over the anus to the distal coccygeal region. Ventral surfaces solid black, sometimes with a lateral intrusion of yellow from above or with an occasional yellow spot.

Measurements. Snout-vent ♂ 31.5, ♀ 37; head breadth ♂ 10, ♀ 11; head length ♂ 9, ♀ 10; femur ♂ 14.5, ♀ 15.5; tibia ♂ 13.5, ♀ 15.

Habits. All the frogs were collected in rather shady places on the forest floor, on moist stones or on the mossy, water-dripping trunk of forest trees. The species is said to be common in all the Territorio Amazonas and someone informed me that he once saw a specimen inside a church in Ciudad Bolívar.

The Maquiritare Indians consider this *Dendrobates* sacred as one of them enters into the history of their good female deity Cawishowa. This did not prevent the Indians from capturing the frog or from using them to test the effectiveness of curare. If the animal dies, the drug is supposed to be sufficiently strong to kill warm-blooded prey.

The local name in Territorio Amazonas is "sapito minero" (miner's toad).

Additional Localities. Auyantepui (A.M.N.H. 46044-7, 46051); Yapacana (U.S.N.M. 83937-41); Upper Orinoco (Boettger, 1896).

Range. The Venezuelan Guayana. Southeastern Colombia, British Guiana and N. Brasil.

Remarks. No difference was found between the Venezuelan specimens from different localities.

ATELOPODIDAE

Key to the Genera of ATELOPODIDAE *Reported from Venezuela*

I. Hand and foot adapted for grasping; first toe longer than second ..... *Orcophrynella*

II. Hand and foot not adapted for grasping; first toe shorter than second ..... *Atelopus*

Key to the Species of ATELOPUS *Reported from Venezuela*

I. Third finger shorter than distance between eye and tip of the snout; yellow or brownish; Mérida Andes ..... *oxyrhynchus*

II. Third finger longer than distance between eye and tip of the snout; Coastal Range.

A. Above, with a labyrinth of brown markings on a yellow or green background ..... *c. cruciger*

B. Above, uniformly yellow or brownish ..... *c. vogli*

ATELOPUS OXYRHYNCHUS Boulenger

Atelopus oxyrhynchus Boulenger, 1903, Ann. Mag. Nat. Hist., (7) *12*: 554: Río Albarregas, Culata, Sierra Nevada de Mérida, 10,000-11,000 ft.: Nieden, 1926, Das Tierreich. Anura II: 79; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 38, 41.

2 (M.C.Z. 3804-5) Mérida.

Description. Snout flat, pointed, projecting considerably beyond the mouth; nostrils situated a little closer to the tip of the snout than to the eye; tongue narrow, entire and free; eye diameter slightly greater than distance between eye and nostril; interorbital space flat, much broader than an upper eyelid; canthus sharply angular, curved; loreal vertical, concave; tympanum absent; a faint, central, metacarpal tubercle; fingers free or with a short rudimentary web when viewed against a light; first finger very short and thick; subarticular tubercles almost imperceptible; tips of fingers slightly swollen; a faint outer metatarsal tubercle; toes about ½ webbed; subarticular tubercles of toes absent or very faint; heel of the adpressed hind limb extends to the shoulder or to the position of the tympanum. Skin above and on the sides of the body studded with small tubercles and large warts, especially on the posterior half of the body and on the limbs; temporal area and base of the forelimbs with small spiny tubercles; a ridge that commences as a bony ridge at the posterior corner of the eye extends posteriorly as a lateral row of glandules. Belly granular and rugose. Breeding male with longer and slightly enlarged arms and a brown rugosity on the inner side of the first digit.

Color. Lemon or brownish yellow with greenish upper eyelids; a brown streak that originates on the nostril extends posteriorly, passing the margin of the upper eyelids and marking the glandules of the lateral row. Small brown spots are indicated on the sides of the head of the male specimen. Boulenger describes a blotch of vermilion or orange red on the belly of some of his specimens, but in the material available the ventral surfaces are uniformly yellow.

Measurements. Snout-vent ♂ 40, ♀ 48; head breadth ♂ 11, ♀ 12.5; head length ♂ 13, ♀ 14; femur ♂ 17, ♀ 20; tibia ♂ 16, ♀ 17.

Additional Localities. La Carbonera, 7000 ft. (U.M.M.Z. 57403 [22]; U.S.N.M. 118676); La Culata (A.M.N.H. 10593-6); Mérida (U.M.M.Z. 58902 [5], 51268; C.N.H.M. 3625); Río Mucujún (C.N.H.M. 5646); Venezuela, 3000-4000 m. (Nieden, 1926 [cited from Boulenger, 1903?]).

Range. The subtropical zone and above in the Mérida Andes.

Remarks. U.M.M.Z. 58902 is a male with its natural color or most of it still existing. The ground color is brownish yellow and the larger dorsal tubercles are marked with brown; the

lateral band is well defined at the canthus, but behind the eye it narrows and only borders the lateral row of warts; there is also a brownish drab on the temporal area and behind it the tubercles are also marked with brown. It is possible that the lateral band was broader in this region and faded out, leaving only the tubercles marked with brown. There are also some brown spots on the throat, chest and limbs. In U.M.M.Z. 58902 the brown lateral line is more continuous and better defined than in other specimens.

Irrespective of sex, there seems to be some variation in the form of the snout, which is very long and with a pointed tip in some specimens while in others the tip is rounder and shorter. The skin is sometimes smooth on the anterior half while in some individuals distinct tuberculation extends to the head.

Atelopus oxyrhynchus agrees with *Atelopus c. cruciger* in having a lateral row of warts, a brown, lateral band, spinulosity on the temporal area, tuberculation on the dorsal surface and a somewhat similar aspect. It differs from *Atelopus cruciger* in its much larger size, longer and more pointed snout, much shorter fingers and different coloration.

Atelopus planispina Espada appears to have a snout similar to *A. oxyrhynchus* but its coloration apparently resembles that of *A. c. cruciger* and it differs from *A. oxyrhynchus* in some important characters.

Atelopus cruciger cruciger (Lichtenstein and Martens)

Phrynidium crucigerum Lichtenstein and Martens, 1856, Nomencl. Rept. Amphib. Mus. Berol.: 41: Veragoa.

Phryniscus cruciger Günther, 1858, Cat. Batr. Sal. Brit. Mus.: 44, pl. iii, fig. B.; Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., ed. 2: 154.

Phryniscus bibronii Günther, 1858, Cat. Batr. Sal. Brit. Mus.: 137: Boulenger, 1882, Cat. Batr. Sal. Brit. Mus., ed. 2: 155: Boettger, 1893, Ber. Senckenb. Naturf. Ges.: 39.

Atelopus spumarius Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 38, 41, pl. xiii, figs. 27, 28.

Atelopus cruciger Nieden (part), 1926, Das Tierreich. Anura II: 84; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 38; Müller, L., 1934, Zool. Anz., *108*: 151; Röhl, 1949, Fauna Descr. de Ven., ed. 2: 399, fig. 179.

Atelopus spumarius Alemán, 1952, Mem. Soc. Cienc. Nat. La Salle, *12*: 28, fig. 2.

2 (M.C.Z. 8657-8) Quebrada La Chapa, Nirgua.

5 (U.M.M.Z. 55556) Quebrada La Chapa, Nirgua.

9 (M.C.Z. 8659-61; U.M.M.Z. 55557) Sn. Esteban.
6 (M.C.Z. 17744-9) Cordillera Ocumare.
1 (U.M.M.Z. 68789) Campo Alto, nr. Maracay.

Description. Snout flat, subtriangular, obtusely pointed and projecting slightly beyond the mouth; nostrils closer to the tip of the snout than to the eye; tongue narrow, entire and free; eye diameter equal to distance between eye and nostril; canthus straight, sharply angular; loreal vertical, slightly concave; interorbital space flat, broader than an upper eyelid; a faint, round palmar tubercle; fingers practically free, except the first which has a short, basal web; first finger short and stout; subarticular tubercles of fingers very indistinct, of toes more distinct; fingers and toes with swollen tips; a flat, rounded, outer and a very indistinct inner metatarsal tubercle; first toe very short; toes ½ to ¾ webbed; heel of the adpressed hind limb extends to the anterior corner of the eye. Skin above, studded with minute granules or tubercles and flat warts on the posterior third; a glandular row of warts from eye to groin. Below, areolate and rugose.

Color. Above, yellowish or green with a labyrinth of irregular, usually confluent, dark brown reticulations; one of the markings sometimes forms a large X at the nape; a brown lateral stripe from tip of the snout to groin; ventral surfaces of the limbs and flanks, below the lateral stripe, broadly marbled with brown; belly and throat yellowish white.

Measurements. Snout-vent ♂ 33.5, ♀ 32; head breadth ♂ 9, ♀ 8; head length ♂ 8, ♀ 9; femur ♂ 15, ♀ 15; tibia ♂ 16, ♀ 15.5.

Habits. This species occurs in great numbers in the proximity of streams and sometimes on plants up to a height of 1.5 m. (Roze).

Additional Localities. Curanna (Cumaná, Günther, 1858); Curupao (U.S.N.M. 117546-50); Curucuruma (U.C.V. 41); R. Chacaíto (U.S.N.M. 128877-81); El Hatillo (Alemán, 1952); Guamitas (U.C.V. 9); Los Canales (U.S.N.M. 128853-76, 117542-5); Between Maracay and Ocumare (U.S.N.M. 81137); Puerto Cabello (Günther, 1858; Boettger, 1893); Rancho Grande (U.S.N.M. 97196-97200; U.C.V. 54, 59-62, 64, 73, 80-1); Turgua (Alemán, 1952); Venezuela (Nieden, 1926).

Range. The Coastal Range from Yaracuy to Sucre.

Remarks. There seem to be two color varieties of this form, one of them as shown by Günther (1858, pl. III) is characterized

by very close and fine reticulations on the dorsum, usually an X-shaped marking at the nape and another chevron-shaped marking at the sacral region. The other, as shown by Lutz (1927, pl. XIII) has a more broken pattern, there is no well defined X-shaped marking, and the basic color seems to be darker. Only the latter variety is found in Rancho Grande and in Nirgua and San Esteban but both are found in the M.C.Z. series from Cordillera Ocumare. The specimens from Guamita and Curucuruma have the fine pattern. The first is a large example, 42 mm. in length.

U.C.V. 64 is peculiar in being very dark, almost black above, and in having distinct broad marbling on the lower flanks and ventral portion of the limbs, and scattered dark spots on the belly and throat.

Although *Phrynidium crucigerum* was described from Veragua, Panamá, the alleged cotypes (Berlin Mus. 3387(3)) represent the Venezuelan species, which the original description also fits. It thus appears that the *A. cruciger* coming from Venezuela suffered an exchange of locality data with the *Eleutherodactylus gollmeri* coming from Panamá, with the result that *Eleutherodactylus gollmeri* was for a long time considered to have Caracas as its type locality, while *A. cruciger* was thought to be Panamanian. In this paper, the range of *Atelopus cruciger* is limited to the Coastal Range of Venezuela.

Atelopus cruciger vogli Müller

Atelopus cruciger vogli Müller, L., 1934, Zool. Anz., *108*: 151: Las Peñas, nr. Maracay.

1 (U.M.M.Z. 92431, paratype) Las Peñas, nr. Maracay.

3 (M.C.Z. 20923-5, paratypes) Las Peñas, nr. Maracay.

Description. Atelopus c. vogli differs from the typical form in its more slender habit, slightly more projecting snout; longer and more slender inner finger; less webbed toes (⅓ to ½) and different coloration. The dorsal and ventral color is yellow, but, according to Müller, specimens with brownish dorsums and faintly indicated markings on the anterior part of the back are occasionally found. There is a lateral stripe along the flanks as in *A. c. cruciger*.

Measurements. Snout-vent ♂ 28, ♀ 36.5; head breadth ♂ 7, ♀ 9; head length ♂ 8, ♀ 10; femur ♂ 12, ♀ 16; tibia ♂ 13, ♀ 16.3.

Additional Localities. Las Peñas, Hacienda La Trinidad (U.S.N.M. 113265-6, 113268-74); near Maracay (U.S.N.M. 107328-33 paratypes).

Remarks. The only information I have been able to obtain about the habitat of this form was sent to me by Mr. J. Roze of Caracas, who obtained it through the courtesy of Padre Vogl, the collector. According to this note, *A. c. vogli* is found in a very inaccessible place to which it is necessary to climb by holding to vines and branches.

My examination of this form includes a series of 46 specimens, all of which are uniform yellow above. *Atelopus cruciger cruciger* is also of a plain color dorsally up to snout-vent lengths of 15 mm. (U.S.N.M. 128862-5); at 16.5 mm. snout-vent length (U.S.N.M. 128861) all the adult markings have appeared.

Oreophrynella quelchii quelchii (Boulenger)

Oreophryne Quelchii Boulenger, 1895, Ann. Mag. Nat. Hist., (6) *15*: 521: Summit Mt. Roraima, bet. Brit. Guiana and Venezuela, 8,500 ft.

Oreophrynella Quelchii Boulenger, 1895, Ann. Mag. Nat. Hist., (6) *16*: 125; 1900, Trans. Linn. Soc. London, (2) *8*: 55, pl. v, fig. 3.

Oreophrynella quelchii Nieden, 1926, Das Tierreich. Anura II: 75.

3 (M.C.Z. 3500-2, ctps.) Mt. Roraima, 8500 ft.
2 (M.C.Z. 24072-3) Roraima Plateau, 8000 ft.
1 (C.N.H.M. 43671) Mt. Roraima, 45.
1 (U.S.N.M. 118230) Roraima.

Description. Snout short, rounded; tongue narrow, entire and free; eye diameter almost as long as the snout; interorbital space as broad as an upper eyelid; canthus short and curved, well defined; loreal vertical or almost so; tympanum absent; two flat, rounded, metacarpal tubercles; palm and fingers with small, flat tubercles; fingers very short, distally swollen, the first shorter than second, which is slightly shorter than fourth; metatarsal tubercles very small; sole with small, flat tubercles; first three toes joined at the base and opposed to the other two, first longer than second; heel of the adpressed hind limb extends to the shoulder or near the eye. Skin above, including the upper eyelids and limbs densely tubercular; flanks tubercular; occasionally present, a longitudinal fold or ridge along the posterior part of the thigh. Belly granular.

Color. Above, very dark brown, almost black; loreal region usually smooth and shiny. Below, spotted or broadly marbled with yellow.

Measurements. Snout-vent ♂ 20, ♀ 21.5; head breadth ♂ 7, ♀ 7.5; head length ♂ 5.5; ♀ 6; femur ♂ 8.5, ♀ 8; tibia ♂ 7.5, ♀ 8.

Localities. The Museum of Zoology of the University of Michigan has 38 specimens from the Roraima Plateau. M.C.Z. has two from Roraima, Brasil.

Range. The Venezuelan, British Guianan and Brasilian summit of Mt. Roraima.

Oreophrynella quelchii macconnelli Boulenger

Oreophrynella Macconnelli Boulenger, 1900, Trans. Linn. Soc. London, (2) *8*: 55, pl. v, fig. 1: Base of Mt. Roraima, 3500 ft.

Oreophrynella macconnelli Nieden, 1926, Das Tierreich. Anura II: 76.

No material examined.

Original Description. Distinguished from *Oreophrynella quelchii quelchii* by its more prominent snout, projecting much beyond the mouth and by the greater expansion of the digits which end in distinct truncate disks. Interorbital space broader than an upper eyelid; first toe much longer than second, as long as fourth; no distinct metatarsal or subarticular tubercles; first and second toes appear to be opposable to the fourth and fifth, both fascicles being bound by the thick integument, the third toe, which is the shortest, being free between them; tarso-metatarsal articulation of the adpressed hind limb extends to the eye. Skin above, covered with small, smooth, feebly prominent warts. Lower parts with flat granules.

Color. Above, brown with lighter marblings, and a series of small yellowish spots, forming a line on each side of the back from eye to groin, continued obliquely across the upper surface of the femur; upper lip yellowish, with two dark brown bars below the eye; lower parts whitish.

Measurements. Snout-vent 22.

Range. Only known from the type specimen.

Remarks. I treat this frog as a race of *Oreophrynella quelchii* on account of its close structural similarity to the nominate form (as expressed in the description), and also because one seems to represent the other at the higher elevations of Roraima and because no other member of the genus is known to occur in South America.

See remarks under *Otophryne robusta.*

RANIDAE

Rana palmipes Spix

Rana palmipes Spix, 1824, Spec. Nov. Test. Ran., 29, pl. v, fig. 1: Amazon; Boulenger, 1920, Proc. Amer. Acad. Arts Sci. (9)*55*: 473; Lutz, A., 1927, Mem. Inst. Osw. Cruz, *20*: 40, 47, pl. ix, figs. 7-9; Schmidt, K. P., 1932, Zool. Ser. Field Mus. Nat. Hist., *18*: 161; Alemán, 1952, Mem. Soc. Ciene. Nat. LaSalle, *12*: 28, fig. 4.

Ranula Gollmeri Peters, 1859, Monatsb. Akad. Wissensch. Berlin: 402.

Rana affinis Peters, 1859, Monatsb. Akad. Wissensch. Berlin: 403; Cope, 1866, Proc. Acad. Nat. Sci. Philadelphia: 130.

1 (U.P.R. 226) Tapara, iv.50.

Description. Snout subovoid; tongue deeply notched behind; vomerine odontoids in two short or rounded, oblique and posteriorly convergent groups between the choanae; eye diameter as long as distance between eye and nostril; interorbital space as broad as an upper eyelid; canthus distinct; loreal little sloping, deeply concave; tympanum large, ⅔ the eye diameter; subarticular tubercles round, distinct; first finger slightly longer than second; tips of fingers slightly dilated; one elongate, not very distinct, inner metatarsal tubercle; subarticular tubercles of toes elongated, distinct; toes fully webbed with the exception of the fourth which has about 2 free phalanges; tips of toes dilated into small disks; heel of the adpressed hind limb extends to a little beyond the anterior corner of the eye. Skin above and on the hind limbs tubercular; a pair of dorsolateral folds from posterior corner of the eye to groins.

Color. Above, olive, turning to green on the head (in life); anterior and posterior aspects of the thighs black and light marbled; limbs crossbarred; below, yellowish and black marbled.

Measurements. ♀ Snout-vent 50; head breadth 18.3; head length 21; femur 22; tibia 24.

Habits. The only specimen was caught very early in the morning, half submerged in the waters of the Cunucunuma River. The species does not seem to be common in the region.

Additional Localities. Arabopó (U.M.M.Z. 85207-8); Baruta (Alemán, 1952); Bejuma (U.M.M.Z. 55586); Bermúdez St. (C.N.H.M. 17772-4); Caracas (Peters, 1859); Caserío Silva; Cumanacoa (Schmidt, 1932); El Hatillo (Alemán, 1952); Río Lamona (U.M.M.Z. 55576); Maracay (Lutz, 1927); Nirgua, Laguna de los Coronjos (U.M.M.Z. 55577-8); San Féliz, Estación Táchira (U.M.M.Z. 55579); Tributary of Río Uribante (U.M.M.Z. 85111); Venezuela (U.M.M.Z. 85176; Cope, 1866).

Range. The base of the Mérida Andes, the Coastal Range, the Venezuelan Guayana and probably all the other physiographical provinces of Venezuela. Central America and Trinidad to Perú and Matto Grosso. *Rana palmipes hoffmanni* Müller, 1924, has been described from Costa Rica and *Rana palmipes rionapensis* Andersson, 1945, from Ecuador. *Rana brevipalmata rhoadsi* Fowler, 1913, is considered a synonym.

Remarks. A female specimen with a snout-vent length of 122 mm. has been examined. The heel may extend to between eye and nostril or to the nostril, while the tympanum may be as much as 7/8 the eye diameter. A few specimens are salmon-colored below.

Specimen C.N.H.M. 17773 is probably a male, with a tympanum 3/4 the eye diameter and an infuscated throat. It has the following measurements: snout-vent 66; head breadth 25; head length 28; femur 31; tibia 36.

Cope's "*Ranula* sp. nov., O. Salvin; Vera Paz, Venezuela," which was listed immediately following his *Ranula affinis,* was presumably *Rana palmipes.*

MICROHYLIDAE

Key to the Genera of Venezuelan Microhylidae

I. Clavicle and procoracoid reduced, the former not extending to the scapula and confined to the mesial portion of the procoracoid . . . . . *Elachistocleis*

II. Clavicle and procoracoid extending from midline of girdle to scapula . . . . . *Otophryne*

Elachistocleis ovalis (Schneider)

Rana ovalis Schneider, 1799, Hist. Amphib.: 131 (type loc. not cited).

7 (U.P.R. 219-225) Puerto Ayacucho, vi.50.

Description. Head triangular; snout pointed, about 1 2/3 longer than the eye diameter, projecting considerably beyond the mouth; tongue attached anteriorly and behind but loose in the middle; eye diameter shorter than distance between eye and nostril; interorbital space more than twice as broad as an upper eyelid; canthus absent; loreal slightly oblique; tympanum hidden; three small, indistinct metacarpal tubercles; fingers short, the first shorter than second, which is very little shorter than fourth; one inner metatarsal tubercle, no outer; toes free; subarticular tubercles flattened; heel of the adpressed hind limb does not

reach the shoulder. Skin above, smooth; a transverse fold behind the eyes; a flat oblique fold from posterior corner of eye to shoulder. Below, smooth.

Color. Above, black with minute light points; flanks and ventral surfaces gray, marbled or spotted with orange; a large orange spot at the groin and proximal portion of the thigh; another broad, orange spot along the posterior aspect of the thigh and hidden portion of the tibia; smaller orange spots are present on their margins; throat darkened in the male.

Measurements. Snout-vent ♂ 30.5, ♀ 37; head breadth ♂ 8, ♀ 7.5; head length ♂ 6, ♀ 7; femur ♂ 11.5, ♀ 7; tibia ♂ 11, ♀ 8.

Additional Localities. Espino (U.C.V. 47); Palenque (U.S. N.M. 128847-9); Sta. Elena, 3500 ft., Bolívar (U.M.M.Z. 85143).

Remarks. I find no difference between the Puerto Ayacucho specimens and two paratypes of *Hypopachus pearsei* Ruthven, from Fundación, Colombia (M.C.Z. 3727, 6075). A large, 55 mm. specimen collected by Dr. P. J. Darlington in Río Frío, Colombia, however, has a longer snout that is slightly greater than twice the eye diameter. The spotting on the flanks, groins and thighs of all these specimens is very similar to M.C.Z. 2037 from Surinam. U.M.M.Z. 85143, U.S.N.M. 128847-9 and U.C.V. 47 from Venezuela, as well as M.C.Z. 4089 from Trinidad, have a narrow, well-defined line on the posterior part of the thighs. The Trinidad specimen appears to have very long legs, probably because of its desiccated condition, but groin and ventral spots are still obvious. U.C.V. 47 has ventral spots, small spots under the femoral line and groin spots. U.M.M.Z. 85143 has groin spots, probably scattered spots underneath (very desiccated) and no spot surrounding the femoral line, while the U.S.N.M. specimens are very small and dry and the ventral coloration cannot be detected. I am inclined to believe that there is some variation in the form of the femoral line but that *Elachistocleis pearsei* and *E. ovalis* are conspecific.

The Museum of Comparative Zoology has 8 specimens from Buenavista, Bolivia, 6 of which fall into the description of *E. bicolor* while 2 have small yellow spots below, an inguinal spot, and on one of them, a broad femoral line. *E. bicolor* has a brown or orange belly that is surrounded by yellow on the throat, sides of the belly and lower flanks, thighs and tibiae. The upper lip also has a yellow margin that extends posteriorly to the shoulder. One of the specimens is 33 mm., another 32, while the others are

smaller. In the same lot, a specimen (M.C.Z. 15686) with uniformly yellow ventral surfaces appears to have small spots on the slightly darkened throat. In M.C.Z. 12862, from Bolivia, which should be *E. ovalis* as there are groin and ventral spots (small) below, the sides of the darkened throat (♂) are yellow and the femoral line narrow, reminiscent of the condition in *E. bicolor*. I believe these forms need further study; the fact that the two color variations exist in Bolivia should not be definitely interpreted to mean that the two are full species as this is a region where intergradation of other forms is known to occur. Cei (1956) has already used the name *E. ovalis bicolor* for the Argentinian form.

Measurements. ♂ Snout-vent 54; head breadth 19; head length 18; femur 22.5; tibia 22.

Additional Localities. Arabopó (U.M.M.Z. 85136, 85138).

Range. Mt. Roraima region of Venezuela, British Guiana and probably Brasil. U.M.M.Z. 85139-40 are from the Kurupung R. in British Guiana.

Remarks. The specimens were dry and stiff so that the limbs could not be adpressed to the sides. According to Boulenger the tarso-metatarsal articulation extends to the tympanum.

Phelps (1938b) has demonstrated that, of the several expeditions that visited Mt. Roraima, only the second expedition by McConnell and Quelch could have collected in the small British Guianan segment of the summit plateau. Specimens from 3500 ft. come, however, from Venezuelan territory.

Otophryne robusta Boulenger

Otophryne robusta Boulenger, 1900, Trans. Linn. Soc. London, *8*: 55, pl. v, fig. 5: Mt. Roraima, 3500 ft., "British Guiana" (in error for Venezuela); Nieden, 1926, Das Tierreich. Anura II: 73; Parker, 1934, Monogr. Fa. Microhylidae (London): 109.

1 (U.M.M.Z. 85137) Arabopó.

Description. Snout obliquely truncate; tongue oval, entire and free behind; two well defined, crenulated ridges in front of the pharynx; eye diameter slightly longer than distance between eye and nostril but shorter than the snout; interorbital space much broader than an upper eyelid; canthus angular; loreal vertical, slightly concave; tympanum disproportionately large, much larger than the eye, with which it is in contact; a fine supratympanic fold from posterior corner of eye to shoulder and a lateral fold from this to inguinal region; metacarpal tubercles indistinct; subarticular tubercles absent or only faintly

indicated; fingers free, the first shorter than second which is shorter than fourth; outer toe very short; metatarsal tubercles absent; toes distally spatulate, about ½ webbed, the web extending to the tips as conspicuous lateral fringes. Skin above and below, smooth.

Color. Above, very dark brown, obscurely spotted with darker; groins and posterior aspect of the thighs spotted with yellowish or orange and black. Ventral surfaces of the belly and limbs dirty white, with scattered brown spots; throat and chest dark brown.

LOCALITIES

The following is a list of Venezuelan localities in which frogs have been collected, and a few others mentioned in the text which may be difficult to find. The descriptions are taken from the literature or from personal observation. The equivalents of abbreviations are given below:

H. Temp. = Highest, average, median temperature (C).
L. Temp. = Lowest, average, median temperature (C.).
Ann. Temp. = Average, annual, median temperature (C.).
H. Rain. = Highest, average, median rainfall (mm.).
L. Rain. = Lowest, average, median rainfall (mm.).
Ann. Rain. = Average, annual, median rainfall (mm.).

1. Acarigua, Edo. Portuguesa — 9°33′27″N., 69°11′54″W. — Elev. 186 m. — H. Temp., Mar. (28.5°), L. Temp., Jul. (25.6°), Ann. Temp., 26.8° — H. Rain., Jun. (287), L. Rain., Feb. (5), Ann. Rain. 1503.
2. Acosta, Distrito, Edo. Falcón — In the northeastern part of Falcón, between Zamora and Silva.
3. Albarregas, Río, Edo. Mérida — Río Chama system, with headwaters in Sierra La Culata and mouth above Mérida.
4. Altagracia de Orituco, Edo. Guárico — 9°12′30″N., 66°00′00″W. — Elev. 358 m. — H. Rain., Aug. (168), L. Rain., Feb. (1), Ann. Rain. 913.
5. Amana, Río, Edo. Monagas — Tributary of Río Guanipa, with headwaters in the Coastal Range and mouth 60 km. east of Maturín.
6. Anabén, Colombia — 4°4′N., 67°44′W. approx. — Elev. about 100 to 150 m. A small Colombian village at the angle formed by the Atabapo with the Inírida. Most frogs collected in tall grass some 200 yards from the river (Atabapo) edge or in a cacao planting nearby.

7. Antímano, D. F. — 10°28′N., 66°58′W. approx. — Elev. 928 m.
8. Apure, Río — Large tributary of the Orinoco on the western Llanos.
9. Agüita Waterfalls, Terr. Amaz. — Elev. 988 m. A camp on a 45° slope of Mt. Duida. Conditions, subtropical.
10. Arabopó, Edo. Bolívar — 5°2′30″N., 62°42′30″W. approx. — Elev. 1,216 m. A village at the base of Cerro Roraima, on the valley of Río Arabapó. The river begins with a cascade in the southwestern cliff of Roraima and joins the Cuquenán River some 20 miles to the south. The valley is broad, chiefly savanna covered and bordered on both sides by rolling hills but at about a mile north of the village the grassland terminates. The border of the Weitipú forest, stretching for some 10 miles to the northern slopes of Cerro Weitipú, lies ½ hour walk to the southeast. The extensive forests of Arabopó, starting from the foothills of Roraima, curve around the northern end of the valley and around the ridge reaching southwest to Weitipú. In addition, forest growth occurs in deep valleys and along the margins of streams (Chapman).
11. Aragua de Barcelona, Edo. Anzoátegui — 9°27′29″N., 64°49′33″W. — Elev. 96 m. — H. Temp., Apr. (28°), L. Temp., Jan. (24.9°), Ann. Temp. 26.2° — H. Rain., Aug. (208), L. Rain., Feb. (2), Ann. Rain. 1,030.
12. Aroa, Edo. Yaracuy — 10°26′N., 68°54′50″W. approx. — Elev. around 370 m. On the valley of Río Aroa. This is dry and the native vegetation has been mostly destroyed. Some rocky "quebradas" occur near the town (Williamson).
13. Auyantepui, Cerro, Edo. Bolívar — 5°48′N., 62°33′W. — Elev. 2,400 m. One of the sandstone mesas of the Guayana Highlands. The southern slopes are mostly treeless to 2,000 m. but otherwise the zones are usually well defined, the transitional slopes being narrow or absent (Tate).
14. Avila, Cerro, D. F. — In the vicinity of Caracas. Frogs collected in the forest on the margins of streams between 1,800-2,200 m. Above 1,500 m. the forest is subtropical (Roze).
15. Barcelona, Edo. Anzoátegui — 10°08′06″N., 64°41′05″W. — Elev. 10 m.
16. Barinas, Edo. Barinas — 8°37′49″N., 70°12′10″W. — Elev. 180 m. — H. Temp., Mar. (27.1°), L. Temp., Sept., Oct.

(26.0°), Ann. Temp. 26.6° — H. Rain., Jun. (364), L. Rain., Jan. (11), Ann. Rain. 1,863.

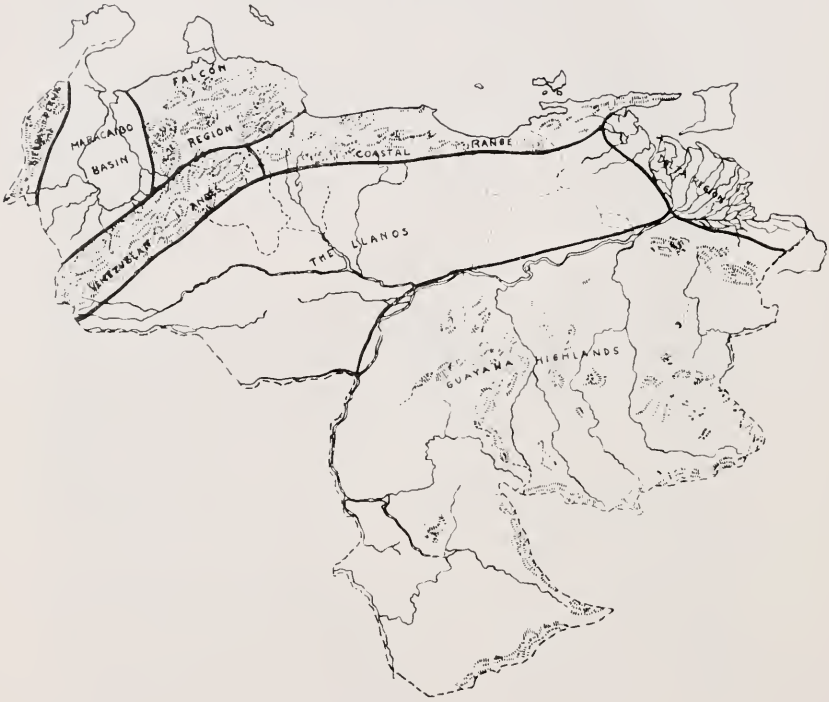

Fig. 13. Faunal regions in Venezuela.

17. Barquisimeto, Edo. Lara — 10°03′57″N., 69°18′45″W. — Elev. 566 m. — H. Temp., Nov. (24.9°), L. Temp., Jan., Jun. (23.6°), Ann. Temp. 24.2° — H Rain., Feb. (5), Ann. Rain. 519 Conditions, xerophilous.
18. Barrancas, Edo. Monagas — 8°42′30″N., 62°11′W. approx. — Elev. not more than 100 m.
19. Baruta, Edo. Miranda — Between Caracas and El Hatillo. Elev. around 1,100 m. Conditions, subtropical.
20. Bejuma, Edo. Carabobo — 10°10′00″N., 68°17′00″W. — Elev. 662 m. — Ann. Temp. 23.9°, H. Rain., May (279), L. Rain., Feb. (2), Ann. Rain. 1,208. In a circular plain surrounded by high hills. Most of the valley of Río Bejuma and the steep surrounding hills are generally under cultivation. "Quebradas" in the hills are usually surrounded by luxuriant growth (Williamson).

21. Bermúdez State — Old Venezuelan state that included the present Anzoátegui, Sucre and Monagas.
22. Boca de Río, Edo. Aragua — 10°17′47″N., 67°38′25″W. — Elev. 415 m. — H. Temp., Apr. (26.0°), L. Temp., Jan. (23.8°), Ann. Temp. 24.9° — H. Rain., Aug. (161), L. Rain., Jan. (1), Ann. Rain. 821.
23. Bonicito, Río, Edo. Zulia — A small river in the Maracaibo District.
24. Caicara, Edo. Bolívar — 7°38′N., 66°14′W. — Elev. around 60 m.
25. Caju, Caño, Terr. Amaz. — A swift running stream at the base of the vertical wall of Marahuaca. Conditions, upper tropical but vegetation is not thick and the trees not high. Collections from about 1,200 m.
26. Calabozo, Edo. Guárico — 8°56′06″N., 67°25′00″W. — Elev. 106 m. — H. Temp., Apr. (29.2°), L. Temp., Jul., Aug. (26.6°), Ann. Temp. 27.5° — H. Rain., Jun. (322), L. Rain., Jan. (1), Ann. Rain. 1,303.
27. Campo Alto, Edo. Aragua — Apart from the fact that it is near Maracay, little has been learned about this locality.
28. Caracas, D. F. (center of city) — 10°30′30″N., 66°54′50″W. — Elev. 920 m. — H. Temp. (at Observatorio Cagigal) May (21.5°), L. Temp., Jan. (18.8°), Ann. Temp. 20.4° — H. Rain., Oct. (139), L. Rain., Feb. (7), Ann. Rain. 897.
29. Carapa, Edo. Anzoátegui — 8°21′N., 63°16′W. approx. — Elev. not more than 100 m.
30. Carayaca, D. F. — 10°32′N., 67°07′W. — Elev. 500 m. approx. Conditions, tropical to subtropical. Frogs collected in the surroundings of a small lake (Roze).
31. Caripito, Edo. Monagas — 10°07′11″N., 53°05′26″W. — Elev. 50 m. approx. — Ann. Temp. 26.1° — H. Rain., Jun. (305), L. Rain., Feb. (39), Ann. Rain. 2,182.
32. Carora, Edo. Lara — 10°11′07″N., 70°15′31″W. — Elev. 420 m. — H. Temp., Jun. (28.7°), L. Temp., Mar. (25.6°), Ann. Temp. 27.7° — H. Rain., Oct. (144), L. Rain., Feb. (11), Ann. Rain. 632.
33. Casa de Julián, Terr. Amaz. — Two houses and an Indian plantation or "conuco" in the middle of the jungle between Tapara and Caño Chana. Frogs collected in the "conuco" at 609 m. or in the margins of a nearby stream at approximately the same elevation. Conditions, tropical.

34. Caserío Silva, Edo. Carabobo—A "posada" between Valencia and Bejuma. The place is situated on the margin of a small, clear stream (Río La Mona) which is generally in the sun but in some places has a little forest remaining along it (Williamson).
35. Casiquiare Canal, Terr. Amaz. — The famous branch of the Upper Orinoco that connects with the Amazon through Río Negro. Conditions, mostly humid tropical.
36. Casurua, Terr. Amaz. — An abandoned hut and "conuco" on the northern margin of Río Cunucununa, about 5 hours by motor boat from the mouth of the river. Soil sandy and vegetation not very luxuriant. Estimated elevation, about 300 m.
37. Chacaito, Quebrada, D. F. — A stream at the eastern boundary of Distrito Federal. Elev. 960-1,000 m.
38. Chana or Chanane, Caño, Terr. Amaz. — A stream between Casa de Julián and Cerro Marahuaca. Conditions, humid tropical. Collections come from the surrounding forest at an elevation of 781 m.
39. Chama, Río, Edo. Mérida — A river that originates in the vicinity of Páramo de Maeuchíes, runs between Sierra La Culata and Sierra Nevada de Mérida and empties into one of the ciénagas on the south of Lake Maracaibo.
40. Chupadero, Chorro, Terr. Amaz. — A small stream that empties into the eastern side of Río Orinoco at about 6 or 7 hours by motor boat up the river from San Fernando de Atabapo. Heavy tropical vegetation on all sides.
41. Ciudad Bolívar, Edo. Bolívar — 8°08′52″N., 63°33′06″W. — Elev. 54 m. — H. Temp., Sept. (28.3°), L. Temp., Jan. (26.5°), Ann. Temp. 27.5° — H. Rain., Jul. (186) L. Rain., Mar. (8), Ann. Rain. 1,022.
42. Cocollar, Edo. Sucre — 10°10′00″N., 63°47′00″W. — Elev. 835 m. H. Rain., Oct. (159), L. Rain., Feb. (17), Ann. Rain. 1,137. Almost arid in the dry season, the area produces a coarse, low grass and usually low trees (Tate).
43. Cocuhy, Río — I have been unable to find this locality in Venezuela. Cucuy or Cocuy is a place in the southwestern corner of Venezuela and perhaps there is a nearby river of the same name.
44. Colonia Tovar, Edo. Aragua — 10°24′38″N., 67°17′03″W. — Elev. 1,790 m. — H. Temp., May (16.3°), L. Temp., Jan. (14.1°), Ann. Temp. 15.4° — H. Rain., Aug. (188), L. Rain., Feb. (14), Ann. Rain. 1,300.

45. Coro, Edo. Falcón — 11°24′48″N., 69°40′42″W. — Elev. 21 m. — H. Temp., Sept. (29.9°), L. Temp., Jan. (27.1°), Ann. Temp. 28.4° — H. Rain., Nov. (100), L. Rain., Feb. (14), Ann. Rain. 442.
46. Cosme, Cerro, Edo. Falcón — 10°53′N., 68°41′W. approx. — Elev. probably 250-300 m.
47. Cotiza, Río, Camino de Galipán, D. F. — Granja Cotiza is near Caracas at an elevation of 900 m. Conditions, subtropical (Chardón).
48. Cúa, Edo. Miranda — 10°09′42″N., 66°53′20″W. — Elev. 241 m. — H. Rain., Jun. (218), L. Rain., Feb., Mar. (5), Ann. Rain. 959.
49. Culata, Edo. Mérida — See La Culata.
50. Cumaná, Edo. Sucre — 10°27′47″N., 64°10′37″W. — Elev. 3 m. — H. Temp., Oct. (27.6°), L. Temp., Jan. (25.7°), Ann. Temp. 26.9° — H. Rain., Aug. (64), L. Rain., Feb., Mar. (4), Ann. Rain. 375.
51. Cumanacoa, Edo. Sucre — 10°15′00″N., 63°55′10″W. — Elev. 240 m. — Ann. Temp. 24.7° approx. — H. Rain., Aug. (223), L. Rain., Feb. (17), Ann. Rain. 1,336. In the valley of Río Manzanares. The floor of the hill encircled valley is level and apparently formed by sedimentation. Most of the area is under cultivation (Tate).
52. Cumarebo, Edo. Falcón — 11°29′25″N., 69°21′26″W. — Elev. 13 m.
53. Cunucunuma, Río, Terr. Amaz. — A tributary of the Orinoco with its mouth at about 250 km. up the river from San Fernando de Atabapo. Except for an occasional small savanna or "conuco," the margins of the Cunucunuma are heavily forested from its mouth to Tapara and probably farther up.
54. Cuquenán, Cerro, Edo. Bolívar — The second largest of Mt. Roraima mountains. Elev. 2,584.
55. Cuquenán, Valley, Edo. Bolívar — Valley of Río Cuquenán, an upper tributary of Río Caroní, with headwaters in Mt. Roraima.
56. Curucuruma, Edo. Aragua — Elev. 1,000 m. approx. Conditions, subtropical (Roze).
57. Curupao, Edo. Miranda — 10°30′00″N., 63°38′18″W. — Elev. 420 m. — H. Rain., Jun. (155), L. Rain., Mar. (5), Ann. Rain. 1,082. At 1,120 m. H. Rain., Sept. (159), L. Rain., Mar. (18), Ann. Rain. 1,305.

58. Distrito Federal — District in which the capital city of Venezuela is located.
59. Duida, Cerro, Terr. Amaz. — A sandstone cerro on the southern margin of Río Cunucunuma. See Esmeralda, Agüita Waterfalls, Caño Pescado, and La Culebra.
60. Egido, Edo. Miranda — 8°32′45″N., 71°15′17″W. — Elev. 1,167 m. — Ann. Temp. 22.6° — H. Rain., Nov. (176), L. Rain., Jan. (23), Ann. Rain. 984.
61. El Baúl, Edo. Cojedes — 7°05′57″N., 68°17′01″W. — Elev. 102 m. — H. Rain., Jun. (402), L. Rain., Feb., Mar. (0), Ann. Rain. 1,662.
62. El Hatillo, Edo. Miranda — 10°27′N., 66°54″W. approx. Elev. around 1,100 m.
63. El Junquito, D. F. — Elev. 1900-2100 m. Conditions, subtropical, except in the higher elevations where only grass and low shrubs occur.
64. El Limón, D. F. — 10°28′N., 67°18′W. approx. — Elev. 577 m. — Ann. Temp. 22.2° — H. Rain., Oct. (204), L. Rain., Feb. (33), Ann. Rain. 1,477.
65. El Mene de Acosta, Edo. Falcón — 11°00′30″N., 68°31′-00″W. approx. Elev. not more than 100 m.
66. El Mene de Buchivacoa, Edo. Falcón — 10°43′N., 71°00′W. approx. Elev. not more than 100 m.
67. El Periquito, Cerro, Edo. Monagas — 10°13′N., 63°41′W. — Elev. 500 m. approx. Conditions, tropical to subtropical.
68. El Sombrero, Edo. Guárico — 9°23′10″N., 67°03′17″W. — Elev. 160 m. — H. Rain., Jul. (252), L. Rain., Feb., Mar. (0), Ann. Rain. 1,205.
69. El Valle, D. F. — 10°29′07″N., 66°50′52″W. — Elev. 885 m. — H. Temp., May (21.7°), L. Temp., Jan. (19°), Ann. Temp. 20.7° — H. Rain., May (117), L. Rain., Feb. (5), Ann. Rain. 797.
70. Encontrados, Edo. Zulia — 9°04′30″N., 72°18′00″W. approx. In the humid, tropical plain southwest of Lake Maracaibo.
71. Escorial, Edo. Mérida — 8°42′N., 72°02′W. approx. — Elev. 2,500 m. and up. Mammals have been collected above timber line at 3,000 m.
72. Esmeralda, Terr. Amaz. — An abandoned native hacienda at about 50 km. up the Orinoco from the mouth of Río Cunucunuma. Located on a mostly flat, grassy savanna with occasional low, swampy areas.
73. Espino, Edo. Guárico — 8°34′N., 66°01′W. — Elev. about 200 m. — Specimens collected in gallery forest at the margin of a stream (Roze).

74. Gé, Río, Edo. Zulia — Tributary of Río Palmar, near Villa del Rosario, west side of Lake Maracaibo.
75. Guachi, Río, Edos. Mérida and Zulia — The Río Guachi arises in the northwestern slopes of the Andes and empties into the southern end of Lake Maracaibo, some 12 miles east of the mouth of Río Chama (Osgood and Conover).
76. Guamitas, Parque Nacional, Edo. Aragua — Elev. 700 m. approx. Conditions, tropical to subtropical.
77. Hiquerote, Edo. Miranda — Collections come from the surroundings of the many rivulets and channels that connect with the sea in this area (Roze).
78. Jacaré, Terr. Amaz. — A small Indian village on the northern margin of Río Cunucunuma between Casurña and La Culebra. Conditions, heavy tropical.
79. Kukenam — See Cuquenán.
80. Kunana, Edo. Zulia — Savanna on the southern side of Río Negro, Perija Range. Elev. 1100 m.
81. La Azulita, Edo. Mérida — 8°42′03″N., 71°25′32″W. — Elev. 1,135 m. — H. Rain., Jun. (197), L. Rain., Jan. (42), Ann. Rain. 1,398. Village on west side of Río Guachi. Some of the surrounding country is cleared for the production of sugar and coffee, but most of it is heavily forested. Conditions, humid tropical to subtropical (Osgood and Conover).
82. La Carbonera, Edo. Mérida — 8°37′30″N., 71°21′00″W. approx. — Elev. 2,128 m. An "hacienda" at the northeastern slopes of Páramo Tambor, near the headwaters of a western branch of Río Guachi. Temperate forest and open cleared meadows prevail (Osgood and Conover).
83. La Chapa, Quebrada, Edo. Carabobo — A stream near the town of Miranda. Collections come from the wooded ridges at 1,109 m.
84. La Cruz Pruviera, Edo. Guárico — I have been unable to obtain any information about this locality. Specimens from this place were collected by Dr. Henri Pittier.
85. La Culata, Edo. Mérida — A sierra of the Mérida Andes extending for 80 km. between Páramo de Chequé (3894 m.) to La Cuchilla (2,475 m.). A páramo (440 m.) in the above mentioned sierra.
86. La Culebra, Edo. Miranda — At about 30 km. in straight line from El Junquito but separated from this locality by two large and deep valleys. Although the approximate

elevation is 1,800 m., the conditions are mostly tropical due to its location in the Internal Range where the trade winds are little felt (Roze).

87. La Culebra. Pico. Terr. Amaz. — An eastern peak of Mt. Duida rising from Savanna La Culebra at 334 m. and reaching an approx. elev. of 1398 m. Talus forest to 1000 m. where the subtropical forest commences. At about 1340 m. trees disappear and the terrain is characterized by loose rocks, among which a small, spiny pineapple grows abundantly.
88. La Culebra, Savanna, Terr. Amaz. — Savanna at the base of Pico La Culebra. Elev. 334 m.
89. La Fría, Edo. Táchira — 8°13′N., 72°19′W. approx. — Elev. 140 m. The forest to the south of the town consists of a heavy, mixed growth; to the north the terrain is nearly flat with occasional, muddy and swampy spots, and to the east there is a sandy "quebrada" with a good flow of water (Williamson).
90. La Guaira, D. F. — 10°30′48″N., 66°56′02″W. — Elev. 5 m. — H. Temp., Sept. (28.1°), L. Temp., Jan., Feb. (25.2°), Ann. Temp. 26.8° — H. Rain., Nov. (104), L. Rain., Apr. (17), Ann. Rain. 553. Conditions, arid and semiarid but mountains rise to 900 m. immediately behind the town and constant precipitation in them produces a number of streams that are followed by some forest growth along their course to the sea.
91. Lagunillas, Edo. Zulia — 10°07′20″N., 71°15′30″W. — Elev. 5 m. H. Temp., Oct. (28.8°), L. Temp., Jan. (27.5°), Ann. Temp. 28.3° — H. Rain., May (125), L. Rain., Jan. (7), Ann. Rain. 900. Village on the eastern shore of Lake Maracaibo. Behind the village there is an extensive, shallow lagoon or ciénaga filled with water plants and bordered by rushes and mangroves. The surrounding country is arid to semiarid (Osgood and Conover).
92. La Mona, Río, Edo. Carabobo — See Caserío Silva.
93. La Pascua, Edo. Guárico — 9°12′30″N., 66°01′00″W. approx. — Elev. 195 m.
94. Las Peñas, Ravine, Edo. Aragua — Near Maracay. See remarks under *Atelopus cruciger vogli*.
95. Las Quiggas, Edo. Carabobo — A village on Río San Esteban and a stream that passes by (Williamson).
96. La Trinidad, Hacienda, Edo. Aragua — 10°21′10″N., 67°36′07″W. — Elev. 455 m. — H. Rain., Aug. (185), L. Rain., Feb. (1), Ann. Rain. 984.

97. La Trinidad, Edos. Sucre-Monagas — A coffee plantation in Mt. Turumiquire at an elevation of 6000 ft. Conditions, subtropical.
98. Los Canales, Planta Eléctrica de Naiguatá — I have been unable to obtain information about this locality.
99. Los Coronjos, Laguna, Edo. Yaracuy — A lagoon in Nirgua.
100. Los Teques, Edo. Miranda — 10°24′48″N., 67°02′02″W. — Elev. 1169 m. — H. Rain., Jun. (161), L. Rain., Mar. (10), Ann. Rain. 1,126.
101. Los Venados, D. F. — 10°32′28″N., 66°53′66″W. — Elev. 1,524 m. — Ann. Temp. 9.2° — Ann. Rain. 716.
102. Macuto, D. F. — 10°36′50″N., 66°53′00″W. approx. Three miles east of LaGuaira. It is said to present a most fertile and flourishing character (Robinson and Lyon).
103. Machiques, Edo. Zulia — 10°03′18″N., 72°23′49″W. — Elev. 150 m. — H. Rain., Oct. (241), L. Rain., Jan. (8), Ann. Rain. 1,519.
104. Manamo, Caño, Delta Amacuro — Channel that forms the boundary between Monagas State and the Delta Amacuro Territory.
105. Maracaibo, Edo. Zulia — 10°38′32″N., 71°36′26″W. — Elev. 6 m. — H. Temp., Aug. (29.4°), L. Temp., Jan., Feb. (27.4°), Ann. Temp. 28.3° — H. Rain., Oct. (149), L. Rain., Feb. (0), Ann. Rain. 573. Conditions, arid.
106. Maracay, Edo. Aragua — 10°15′17″N., 67°35′57″W. — Elev. 445 m. — H. Temp., Apr. (26.2°), L. Temp., Jan. (23.7°), Ann. Temp. 24.7° — H. Rain., Aug. (170), L. Rain., Jan. (1), Ann. Rain. 858.
107. Marahuaca, Cerro, Terr. Amaz. — One of the Guayanan Cerros, constituting with the Duida and Huachamacari, a distinct triangle at the western end of the Pacaraima System. Conditions tropical to about 1231 m., where a subtropical pocket occurs on the northern side. Elev. 2581 m.
108. Maturín, Edo. Monagas — 9°44′30″N., 63°10′30″W. — Elev. 75 m. — H. Temp., Apr. (26.8°), L. Temp., Jan. (24.5°), Ann. Temp. 25.7° — H. Rain., Jun. (208), L. Rain., Mar. (18), Ann. Rain. 1,248.
109. Mérida. Edo. Mérida — 8°35′56″N., 71°09′24″W. — Elev. 1,623 m. — H. Temp., Aug. (19.7°), L. Temp., Jan. (18.2°), Ann. Temp. 19.2° — H. Rain., Sept. (273), L. Rain., Feb. (45), Ann. Rain. 1,816. Situated in a mesa between Río Chama and Río Albarregas. In the river valleys conditions

are tropical or subtropical but mountains rise abruptly on either side and temperate forests are accessible within a few hours travel (Osgood and Conover).

110. Monay, Edo. Trujillo — 9°24′02″N., 70°36′21″W — Elev. 340 m. — H. Rain., Aug. (162), L. Rain., Mar. (27), Ann. Rain. 970.
111. Motatán, Edo. Trujillo — 9°32′00″N., 70°24′00″W. — Elev. 296 m. — H. Rain., Oct. (206), L. Rain., Feb. (52), Ann. Rain. 1,504.
112. Minapana, Quebrada, Edo. Yaracuy — A stream near Palma Sola.
113. Mucujún, Río, Edo. Mérida — Río Chama System, with headwaters in Sierra La Culata and mouth above Mérida.
114. Negro, Río, Terr. Amaz. — River that connects the Amazon with the Orinoco through the Casiquiare Canal.
115. Nirgua, Edo. Yaracuy — 10°09′06″N., 68°34′13″W. — Elev. 798 m. — H. Rain., May (171), L. Rain., Feb. (1), Ann. Rain. 923. Conditions, similar to Bejuma but country is rougher and adjacent to the town more despoiled. Río Borria runs at the foot of the plateau on which the town is built. Above the intake of the city water supply, the river flows through brush and small trees. A few miles north of town there is a quebrada in pastures, brush, and coffee and banana plantings; on top of the hill, a humid forest (Williamson).
116. Ocumare de la Costa, Edo. Aragua — 10°27′30″N., 67°46′07″W. approx. — Elev. 15 m.
117. Ocumare del Tuy, Edo. Miranda — 10°07′03″N., 66°46′07″W. — Elev. 210 m. — H. Rain., Jul. (206), L. Rain., Feb. (15), Ann. Rain. 1,125.
118. Orope, Edo. Táchira — 8°22′30″N., 72°22′00″W. approx. — Elev. not more than 100 m. In the heart of the humid tropical forest where its conditions are developed to the highest degree (Osgood and Conover).
119. Oropito, Río, Edo. Zulia — River that passes near La Fría in the southern part of Lake Maracaibo.
120. Palenque, Edo. Guárico — 8°59′30″N., 66°58′00″W. approx. — Elev. between 100 and 200 m.
121. Palma Sola, Edo. Falcón — 10°36′35″N., 68°33′35″W. — Elev. 40 m. approx. — Ann. Rain., 1,703. In a nearly flat, heavily wooded country. The Aroa River, which passes by, is swift and shallow in this region.

122. Pariaguán, Edo. Anzoátegui — 8°06′00″N., 64°44′00″W. — Elev. 123 m. — H. Temp., Apr. (27.4°), L. Temp., Jan., Jun., Dec. (26.0°), Ann. Temp. (26.3°). H. Rain., Jul. (311), L. Rain., Feb. (0), Ann. Rain. 1,428.
123. Parmana, Edo. Guárico — 7°50′00″N., 65°50′00″W. approx. — Elev. 80 m. approx. Vegetation intermediate between that of gallery forests and llanos. During the rainy season, the surrounding area is flooded but Parmana remains above the waters (Roze).
124. Paso del Diablo, Terr. Amaz. — 2°16′30″N., 66°33′00″W. approx. — Elev. 100-200 m.
125. Paují, Edo. Falcón — 11°01′N., 68°38′W. approx. — Elev. 200-500 m.
126. Paulo, Edo. Bolívar — Elev. 1,216 m. An Arecuna village, some seven miles to the southwest of the cliffs of Roraima, stands at the tip of a ridge springing from the Cuquenán foothills. The Cuquenán River and another stream to the west, which unite a quarter of a mile to the south, flank the ridge. Excepting a few small portions, damaged but not wholly destroyed by a fire, the forest has been replaced by deep mat of bracken, with innumerable bare whitening tree trunks thrusting through. Pokeweed usually mixed with the all-pervading bracken, has grown in as a replacement plant very abundantly at altitudes of 4,000-6,000 ft. The steep country south and east of Paulo is mostly devoid of forest; only in sheltered ravines and re-entrants small pockets of forest exist, invariably much damaged by fire (Chapman).
127. Pescado, Caño, Terr. Amaz. — A stream between Esmeralda and Cerro Duida. The ground in this region is level, trees tall and straight and many palms are distributed through it (Tate).
128. Petare, Edo. Miranda — 10°28′40″N; 66°48′32″W. — Elev. 844 m. — Ann. Temp. 22.0° — H. Rain., May (145), L. Rain., Mar. (5), Ann. Rain. 784.
129. Pie del Avila, D. F. — See Avila.
130. Pie del Cerro, Edo. Aragua — 10°19′30″N., 67°18′50″W. approx. — Elev. 810-1,350 m.
131. Puerto Ayacucho, Terr. Amaz. — 5°53′40″N., 67°41′49″W. — Elev. 110 m. — H. Temp., Mar. (30.1°), L. Temp., Jul. (26.4°), Ann. Temp. 27.9° — H. Rain., Jun. (551), L. Rain., Feb. (3), Ann. Rain. 2,455. Conditions, mostly semi-arid, large extensions of savanna occur to the south and

east of the town but a strip of forest margins the Orinoco up to Sanariapo and high forest is also found on the left (east) of the road between Puerto Ayacucho and Sanariapo.

132. Puerto Cabello, Edo. Carabobo — 10°29′42″N., 68°00′31″W. — Elev. 5 m. — H. Temp., Oct. (27.3°), L. Temp., Feb. (25.2°), Ann. Temp. 26.2° — H. Rain., Jul. (10), L. Rain., Feb., Mar. (3), Ann. Rain. 82.
133. Puerto La Cruz, D. F. — 10°32′00″N., 67°21′00″W. approx. — Elev. 10 m. approx.
134. Rancho Grande, Edo. Aragua — 10°21′30″N., 67°41′00″W. — Elev. 1,130 m. — Ann. Temp. 18.9° approx. — H. Rain., Aug. (317), L. Rain., Jan. (19), Ann. Rain., 1,747.
135. Raudal de Dios, Terr. Amaz. — A rapid in the Cunucunuma River between La Culebra and Tapara. Elev. about 1,200 ft. Conditions, heavy tropical.
136. Riecito, Edo. Falcón — A few km. east of Cerro Cosme.
137. Roraima, Cerro, Edo. Bolívar — 5°12′00″N., 60°44′00″W. — Elev. 2,614 m. A flat-topped, quartzite cerro with vertical sides and a summit area of 25 sq. km. The Summit Camp of Tate and previous visitors was located in a shallow, rocky basin only a few hundred yards in extent, close to the summit of the ledge. See also Arabopó and Cuquenán.
138. Rosario, Edo. Zulia — 9°13′N., 72°39′W. approx. — Elev. not more than 100 m. A small village at the end of the extensive "ciénagas" of the Santa Ana-Catatumbo.
139. Sabana de Mendoza, Edo. Trujillo — 9°27′27″N., 70°46′11″W. — Elev. 118 m. — H. Rain., Oct. (150), L. Rain., Jan. (31), Ann. Rain. 1,122.
140. Sanariapo, Terr. Amaz. — 5°15′00″N., 67°49′00″W. — Elev. 150 m. approx. Conditions, semiarid. East of the village there is a small spring that is surrounded by a patch of humid forest.
141. San Antonio, Terr. Amaz. — 3°30′30″N., 66°44′30″W. approx. — Elev. between 100-200 m. An abandoned plantation at the northeastern margin of the Orinoco. Conditions, heavy tropical.
142. San Carlos, Terr. Amaz. — 1°55′50″N., 67°03′50″W. approx. — Elev. not more than 100 m.
143. San Cristóbal, Edo. Táchira — 7°46′11″N., 72°14′20″W. — Elev. 830 m. — H. Temp., Mar. (22.8°), L. Temp., Jan. (21.4°), Ann. Temp. (22°), H. Rain., Jun. (218), L. Rain., Feb. (22), Ann. Rain. 1,463.

144. San Esteban, Edo. Carabobo — 10°25′50″N., 68°01′00″W. approx. — Elev. between 100-200 m. A town on Río San Esteban. The river is a swift stream except below the town, where it flows for several miles through nearly level sand plain. Above San Esteban the entire valley is wooded with much coffee and cacao on the main stream and more native forest on the higher "quebradas"; below the town, the stream is largely in the sun (Williamson).
145. San Felipe, Edo. Yaracuy — 10°20′38″N., 68°44′04″W. — Elev. 255 m. H. Temp., Oct. (26.6°), L. Temp., Jan. (25.4°), Ann. Temp. 26.1° — H. Rain., May (209), L. Rain., Mar. (20), Ann. Rain. 1,496. In the alluvial plain of the Yaracuy River.
146. San Fernando de Apure, Edo. Apure — 7°53′40″N., 67°28′11″W. — Elev. 73 m. — H. Temp., Apr. (28.7°), L. Temp., Jun. (26.3°), Ann. Temp. 27.4° — H. Rain., (287), L. Rain., Jan. (1), Ann. Rain. 1,415.
147. San Fernando de Atabapo, Terr. Amaz. — 4°02′20″N., 60°42′30″W. approx. — Elev. between 100-200 m. San Fernando marks the place where the savanna and semiarid country ends and the dense jungle begins. Collections come mostly from the savannas surrounding the town and from a fairly extensive forest patch at the edge of the Atabapo River.
148. San Juan de los Morros, Edo. Guárico — 9°53′00″N., 67°20′42″W. — Elev. 430 m. H. Temp., Apr. (25.9°), L. Temp., Jan. (23.2°), Ann. Temp. 24.5° — H. Rain., Jul. (301), L. Rain., Feb. (5), Ann. Rain. 1,342.
149. San Juan, Río, Edo. Zulia — Tributary of Río Motatán, in the southeastern part of Lake Maracaibo.
150. San Julián, D. F. — 10°36′N., 66°51′W. approx. — Elev. near sea level. The hamlet, consisting of a few scattered huts, is located in an irrigated valley above the village of Caraballeda. The mountains behind San Julián are well forested (Robinson and Lyon).
151. Santa Ana, Río, Edo. Zulia — Large river on the western side of Lake Maracaibo.
152. Santa Catalina — Apart from the fact that it is in Río Orinoco, I have been unable to obtain any other information about this locality.
153. Santa Elena, Edo. Bolívar — 4°36′05″N., 61°06′52″W. — Elev. 907 m. — H. Temp., Mar. (22.4°), L. Temp., Jul. (21.1°), Ann. Temp. 21.8° — H. Rain., Jun. (251), L.

Rain., Feb. (62), Ann. Rain. 1,628. In the Gran Sabana, in the angle formed in the southeast by Venezuela, British Guiana and Brasil.

154. Santa Elena, Edo. Mérida — 8°50′30″N., 71°35′30″W. approx. — Elev. not more than 100 m. In the alluvial plain characterized by heavy, humid tropical forest (Osgood and Conover).
155. Santa Lucía, Edo. Miranda — 10°18′N., 66°39′W. approx. — Collections come from elevations between 300 and 810 m.
156. Sierra Maestra, Edo. Aragua — I have been unable to obtain any information about this locality.
157. Sosa, Edo. Guárico — Elev. 200 m. approx. On Río Guárico. Frogs collected in the grass at the margin of the river. Gallery forest follows the course of Río Guárico but the rest of the country is savanna covered (Roze).
158. Táchira, Edo. Táchira — 8°07′N., 72°20′ W.approx. — Elev. about 365 m. Heavily wooded region of steep or precipitous mountain sides and many streams (Williamson).
159. Tanaguarena, D. F. — In the vicinity of La Guaira and Macuto. Elev. 10 m. Conditions, arid to semiarid (Roze).
160. Tapara, Terr. Amaz. — The last navigable (canoe) point of Río Cunucunuma. Conditions, humid tropical except at the edge of the river where the trees are sparse and small.
161. Temiche, Terr. Amaz. — A camp on the southern slopes of Cerro Marahuaca, at an elevation of 4,050 ft. Conditions, humid tropical or lower subtropical. A great abundance of an enormously leaved palm and tall trees that make the place very umbrageous. A stream at about 50 ft. from camp.
162. Trujillo, Edo. Trujillo — 9°22′24″N., 70°26′08″W. — Elev. 790 m. — H. Rain., Nov. (137), L. Rain., Jan. (41), Ann. Rain. 936.
163. Tucacas, Edo. Falcón — 10°15′30″N., 68°19′08″W. — Elev. 4 m. H. Rain., Nov. (212), L. Rain., Feb. (37), Ann. Rain. 1,053. Dry woods and dry Heliconia patches adjacent to the town; back of it, a small boggy stream.
164. Tunapucito, Edo. Sucre — 10°36′00″N., 63°09′30″W. approx. — Elev. about 300 m.
165. Turgua, Edo. Miranda — At about 20 km. from Caracas, between Petare and Baruta. Elev. 1,100 m. approx. Conditions, subtropical (Roze).

166. Turumiquire, Cerro, Edos. Sucre-Monagas — 10°7′N., 63°52′W. approx. Elev. 2,630 m. A mountain on the eastern part of the Coastal Range.
167. Unare, Edo. Anzoátegui — 10°05′30″N., 65°11′00″W. — Elev. sea level approx.
168. Upata, Edo. Bolívar — 8°01′07″N., 62°24′33″W. — Elev. 340 m. H. Rain., May (138), L. Rain., Feb. (0), Ann. Rain. 868.
169. Uribante, Río, Edos. Táchira and Barinas — Tributary of Río Apure, with headwaters in the Andes of Táchira and mouth at 7°18′N., 70°46′W. approx.
170. Valencia, Edo. Carabobo — 10°11′10″N., 67°59′58″W. — Elev. 478 m. — H. Temp., Oct. (24.9°), L. Temp., Jan. (24.0°), Ann. Temp. (24.6°). H. Rain., Aug. (187), L. Rain., Mar. (3), Ann. Rain. 1,120.
171. Villa del Rosario, Edo. Zulia — 10°19′54″N., 72°19′30″W. — Elev. 80 m. approx.
172. Wanadi, Caño, Terr. Amaz. — A swift running stream on the slopes of Mt. Marahuaca. Collections from the stream or from the surrounding heavy jungle at an elevation of 1,225 m.
173. Waika-piapu Mt. (Ualacatipu), Edo. Bolívar — A mountain on the west north-west of Roraima and Cuquenán. Together with the Urutipú and Charantipú it forms a ridge that cuts off the Mazaruni and Cuyuní Rivers.
174. Yapacana, Cerro, Terr. Amaz. — 3°42′N., 62°45′W. approx. — Elev. 1,250 m.
175. Yumarito, Río, Edo. Yaracuy — A stream in Boquerón.
176. Zaraza, Edo. Guárico — 9°20′09″N., 65°19′03″W. — Elev. 60 m. — H. Rain., Jul. (241), L. Rain., Feb. (6), Ann. Rain. 1,144.

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A REVISION OF THE GENUS PSEUDISOBRACHIUM IN NORTH AND CENTRAL AMERICA (HYMENOPTERA, BETHYLIDAE)

BY HOWARD E. EVANS

CAMBRIDGE, MASS., U.S.A.
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No. 2 — *A Revision of the Genus Pseudisobrachium in North and Central America (Hymenoptera, Bethylidae)*

By Howard E. Evans

INTRODUCTION

The bethylid genus *Pseudisobrachium* contains approximately 100 known species, about four-fifths of which occur in the Western Hemisphere and about two-fifths of which are described for the first time in the present revision. There are many undescribed Neotropical species, but I have had to omit the West Indies and South America from present treatment because of inadequate material. The genus is well represented in Europe and in Africa, and the species from these continents are closely similar to the American forms. Two species from the Philippines described by Kieffer (1922) represent the only known Oriental species. Although Kieffer (1914) states that the genus occurs in Australia, I have seen no specimens from that continent and the only species described from there, *P. australiensis* Kieffer, was correctly removed to *Propristocera* by Kieffer himself.

The North American species were first treated by Ashmead (1893) under the name *Isobrachium*, a name now properly restricted to an unrelated Palaearctic genus. Ashmead described and presented a key to six species; he apparently had before him about 15-20 specimens. The characters he used now seem unreliable and in some cases are actually incorrect; his sex associations also tended to be capricious. Kieffer (1906) described one species from Nicaragua and a few years later (1914) presented a key to the species of the world, though there is no evidence that he studied much if any North American material. Fouts (1928) described five new species and presented a revised key to species; he apparently had about 15 specimens before him in addition to Ashmead's material.

I first became interested in the genus about ten years ago and began slowly to gather material. It quickly became apparent that the genus was a large and difficult one and that the existing literature was completely inadequate. The present revision, although based on about 1400 specimens, pretends to be no more than a very preliminary treatment of the genus. Reliable species characters have been more difficult to find than, for example, in the related genera *Dissomphalus* and *Propristocera*, and much difficulty has been encountered in associating the sexes properly.

Nevertheless, I do feel that the revision represents a sufficient advance over earlier work to justify my publishing it at this time.

There are those who question the value of taxonomic studies on a strictly "alpha" level, as this one admittedly is. I can appreciate their arguments and I readily admit that the species of the alpha taxonomist are no more than hypothetical entities. Only more sophisticated studies, involving not only careful, statistically analyzed inventories of the structure of properly sampled populations, but also comparative studies of physiology and behavior, can establish with certainty how a complex of organisms ought properly to be classified. But such studies must have a beginning. *Pseudisobrachium* has been, until recently, like a vaguely plotted continent on an explorer's map. The present study is no more than a beach-head on that continent, but it may perform the important function of serving as a base for further operations.

ACKNOWLEDGMENTS AND SOURCES OF MATERIAL

Pseudisobrachium is poorly represented in the collections of most museums, the sole exception being the U. S. National Museum. However, by gathering material from many sources I have been able to amass enough material for this preliminary study. I am particularly indebted to Karl V. Krombein and Henry K. Townes for making available the valuable material in their personal collections. A. T. McClay, at Davis, California, M. Wasbauer, at Sacramento, California, and Mrs. L. K. Gloyd, at Urbana, Illinois, have provided me with excellent series of certain species taken from light trap collections. My own collecting has enabled me to fill in many gaps. A trip to Mexico during the summer of 1951 was supported by the American Philosophical Society, and a second trip to Mexico and the southwestern United States during 1959 was made possible by a fellowship from the John Simon Guggenheim Memorial Foundation. Additional specimens were collected during several trips to the southern states supported by the National Science Foundation for studies on the behavior of digger wasps.

The following list of institutions and individuals is meant to serve as an acknowledgment to each, as well as an indication of the abbreviation by which each is designated in the text:

Academy of Natural Sciences of Philadelphia (ANSP)
American Museum of Natural History, New York (AMNH)

California Academy of Sciences, San Francisco (CAS)
California Dept. of Agriculture, Sacramento (CDAS)
California Insect Survey, Berkeley (CIS)
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Kansas State University, Manhattan (KSU)
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Museum of Comparative Zoology, Cambridge, Mass. (MCZ)
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R. R. Dreisbach Collection, Midland, Mich. (RRD)
University of Arizona, Tucson (UA)
University of California, Davis (UCD)
United States National Museum, Washington, D.C. (USNM)

BIOLOGY OF THE GENUS

Pseudisobrachium is properly placed as one of the more specialized genera of the tribe Pristocerini. The most closely related genus in the Americas is probably *Propristocera,* a genus in which the males lack a transverse carina margining the propodeal disc behind, as in *Pseudisobrachium.* It is somewhat more distantly related to *Pristocera, Cleistepyris,* and *Dissomphalus. Pluto-Parisobrachium* Kieffer I regard as synonyms of *Pseudisobrachium* (see further discussions under generic diagnosis below).

It must be admitted regrettably that Ashmead's 1893 statement regarding the biology of the genus cannot yet be improved upon. In Ashmead's words, "the genus is found associated with various ants; it may be parasitic upon the ants, or upon the myrmecophilous Coleoptera so frequently found in their nests." There are now many more records of females being taken with ants than there were in Ashmead's time (see list below), but the precise relationship remains to be determined. It should be noted that the species of *Pristocera* attack coleopterous larvae, and there is some evidence that the species of *Dissomphalus* do also. Unfortunately, nothing is known of the biology of other genera of Pristocerini. It is, of course, entirely possible that

Pseudisobrachium has switched from coleopterous to formicid larvae, possibly by way of myrmecophilous forms. There is now strong circumstantial evidence that members of this genus do in fact attack ant larvae (see especially remarks under *P. arenarium* below). This may account for the great success of the genus as compared to most other genera of the tribe. Females are also sometimes taken in Berlese samples of soil or leaf litter, presumably because the sample includes a portion of an ant nest. I have also seen an occasional female from light trap collections, suggesting that females may sometimes leave the soil during the night.

A perusal of the list presented below shows that female *Pseudisobrachium* have been taken with ants of several subfamilies (Formicinae, Dolichoderinae, Myrmicinae, Dorylinae, Ponerinae). Where there are several records for one species, in most cases that species appears to be associated with several genera, sometimes of more than one subfamily. For example, *prolongatum* has been taken with the formicine genera *Camponotus, Acanthomyops,* and *Formica,* as well as the myrmicine genus *Aphaenogaster.* The closely related *arenarium* is recorded with the ponerine genera *Proceratium* and *Stigmatomma. P. ashmeadi* has been taken with the genera *Formica* and *Acanthomyops* (Formicinae) and *Tapinoma* (Dolichoderinae). While Formicinae have been taken with three of six Nearctic species, none of the exotic species has yet been taken with ants of this subfamily.

Since the females are never taken by routine collecting methods, they are rare in collections. Males are much more frequently encountered. Males of some species are diurnal and often taken by sweeping low vegetation either in forests or in open country. I have taken them on honeydew only rarely, and know of only one or two records of them having been taken on flowers. Males of certain other species appear to fly either by day or in the evening, while many species, especially those characteristic of arid country, are fully nocturnal. Nocturnal species tend to have larger eyes and ocelli and are often paler in color (especially the wings). However, some forms with small eyes and ocelli have been taken only at night. Many species exhibit considerable variation in color, eye size, and ocellar size, and it is possible that some of this variation is associated with ecological conditions and the time of flight of local populations. The majority of males of this genus in collections have been taken at light.

Most of the South American and Palaearctic males I have seen are dark in color and have relatively small ocelli, and I am not aware of reports that these species are nocturnal. The evolution of numerous nocturnal species seems to be especially characteristic of desert regions of North America, somewhat paralleling the development of the brachycistidine Tiphiidae.

Further comment is perhaps in order on the difficulty in associating sexes in this genus. Of the North American species, the sexes of only two (*prolongatum* and *rufiventre*) have been associated with any degree of certainty. Theoretically, one should be able to collect males in numbers in certain situations, then search the ant nests of that area diligently for females; having found a female, one ought to be able to place her in an open container in the field and capture the males as they are attracted to her. I have actually given a good deal of thought and time to this scheme, but with completely negative results. On one occasion, I collected 67 male *prolongatum* on a small wooded hillock within a few hours (Plummer's Island, Maryland, Sept. 23, 1960). However, a very careful search of all the ant nests I could find in the area revealed no females. Of course, in the late summer (when male *Pseudisobrachium* are on the wing in the Northeast), most ant nests contain little brood. It is entirely possible that both sexes emerge in the fall and mate and that the females overwinter but do not enter ant nests until spring, when ant colonies are growing and contain much brood. The majority of females which have been taken in ant nests have been taken in the spring or early summer.

RECORDS OF PSEUDISOBRACHIUM TAKEN WITH ANTS[1]

Nearctic Species

P. arenarium Evans.[2] Specimen from St. Charles, Mo., 1949 (M. Talbot), labeled "in vial with *Stig*[*matomma*] *pallipes*" (Ponerinae) [USNM]. Specimen from Philadelphia, Pa., 20 May 1939 (W. L. Brown), labeled "from nest of *Proceratium* sp." (Ponerinae) [USNM]. Dr. Brown has written me that this specimen was taken in Wissahickon Park with *Proceratium silaceum* (Roger). The nest was under a rock in deciduous

[1] All records involve female *Pseudisobrachium* except for one Oriental record which is noted otherwise.

[2] These species are described in the text from the male sex, and in each case the sex association is tentative.

woods; there were 13 adult ants in the nest, 11 workers and 2 ergatoid females. The *Pseudisobrachium* was in the middle of the nest with brood in a space less than one inch in diameter. There were no myrmecophilous beetles in this nest and in fact both this ant and *Stigmatomma pallipes* are not known to harbor such beetles.

P. ashmeadi Evans.[2] Specimen from Arlington, Mass., 24 May 1953 (W. L. Brown), labeled "*Formica fusca* nest in woods" [MCZ]. Specimen from Forest Hills, Mass., 4 May 1915 (W. M. Mann), with two *Tapinoma sessile* (Say) [det. W. L. Brown] on card point on same pin [USNM]. Specimen from Forest Hills, Mass. (no date) (W. M. Mann) with *Acanthomyops claviger* (Roger) on card point on same pin [USNM]. *Tapinoma* belongs to the Dolichoderinae, the other two genera to the Formicinae.

P. occidentale Evans.[2] Specimen from Stanford Univ., Calif., 13 Feb. 1910, with a worker and dealate queen *Tapinoma sessile* (Say) [det. W. L. Brown] on card point on same pin (Dolichoderinae) [USNM].

P. prolongatum (Provancher) (= *mandibulare* Ashmead, *montanum* Ashmead, *myrmecophilum* Ashmead). Ashmead (1893) records *mandibulare* from a nest of *Camponotus pennsylvanicus,* 27 May 1883 (T. Pergande); this specimen is in the USNM, from Washington, D. C., bearing a note to that effect. A second specimen in the USNM, from Washington, D. C., 19 Aug., is pinned with two specimens of *Camponotus nearcticus* Emery [det. W. L. Brown]. The type of *mandibulare,* from Retreat, Haywood Co., N. C. [USNM] is pinned with a worker *Aphaenogaster fulva* Roger (Myrmicinae). Ashmead (1893) also recorded *myrmecophilum* from nests of *Formica rufibarbis* at Helena, Mont., and *montanum* from nests of this ant at Assiniboine, Mont. (both H. G. Hubbard); the ant associated with the specimen from the latter locality has been identified as *Formica cinerea* Mayr by W. L. Brown. Ashmead's record of *rufiventre* from Helena, Mont., from a nest of *Formica obscuripes* Forel, also doubtless applies to *prolongatum.* There are two additional specimens in the USNM, both from Forest Hills, Mass., May 1915 (W. M. Mann); one is pinned with a *Formica* of the *pallide-fulva* group, the other with *Acanthomyops* sp. (*?claviger* Roger) [det. W. L. Brown]. There are two specimens in the MCZ from Lexington, Mass.,

5 June 1955 (W. L. Brown), one labeled "in nest of *Acanthomyops claviger,*" the other labeled "in nest of *Acanthomyops* sp. indet." A specimen from Walsh Co., N. D., 23 June 1950 (W. E. LaBerge) bears the notation "with *Formica* sp."

P. flaviventre (Kieffer). Dr. W. L. Brown has sent me a specimen probably belonging to this species which he took at Little Grassy Lake, Williamson Co., Ill., 10 Aug., 1958, in oak-hickory woods, in leaf litter in or near a nest of *Solenopsis* of group *molesta* Say (Myrmicinae). A number of specimens of this species have been taken in soil (see text for data).

P. rufiventre (Ashmead). Ashmead's (1893) record of this species from Montana probably applies to *prolongatum*, as noted under that species. A specimen from Blue Hills, Canton, Mass., 20 July 1956 (W. L. Brown) is labeled "*Formica obscuriventris* Mayr nest under rock" [MCZ].

Neotropical Species

P. merklei Bruch. Bruch (1917b) described this species along with several other myrmecophiles taken near La Plata, Argentina. In his introduction he states: "mencionaré por ahora los insectos de nuestras capturas y que podemos considerar en cierto modo como huéspedes de *Solenopsis saevissima*" (Myrmicinae).

P. solenopsidicola Bruch. Bruch (1917a) described this species "de un nido de *Solenopsis saevissima* Sm. var. *tricuspis* Forel, en la Sierra de la Ventana [Argentina]" (Myrmicinae).

P. terresi Mann. "Described from a single specimen taken in a nest of *Aphaenogaster relicta* at Diquini [Haiti]" (Myrmicinae) (Mann, 1915).

Palaearctic Species

P. leptanillae Duchaussoy. Duchaussoy (1916) described this species from "Tunisie, Kairouan, Sousse; trouvé par M. le Dr. Santschi, dans les nids des fourmis du genre *Leptanilla*" (Dorylinae).

P. subcyaneum Haliday (= *cantianum* Chitty). Chitty (1906) took the type of *cantianum* "in nest and runs of *Ponera contracta,*" Charing, Kent, England, 3 Aug. 1903. He surmises that *subcyaneum* may attack *Myrmecina latreillei,* (= *M. graminicola* Latr.) but gives no reason for this belief.

Oriental Species

P. sp. A specimen of an apparently undescribed male *Pseudisobrachium* from San Francisco del Monte, Manila, P.I. (R. C. (McGregor) [MCZ] is pinned with two worker *Odontomachus simillimus* (F. Smith) (Ponerinae) [det. E. O. Wilson]. There are no accompanying data, so it can only be tentatively assumed that this male was taken from a nest of the ant.

STRUCTURE AND TERMINOLOGY

Sexual dimorphism is so pronounced in this genus that it is necessary to treat the two sexes separately both here and in the keys and descriptions. Following a discussion of the useful characters of each sex I have provided a summary of the various abbreviations employed in the text.

Males. — Males are fully winged, usually dark in color, and vary in size from 2 to 6 mm. The mandibles (Figs. 7-32) have from 3 to 5 teeth; these teeth are simply numbered one to five, starting with the apical (outermost) tooth. Mandibular dentition is extremely important, and it is desirable to spread the mandibles of freshly caught specimens. The clypeus has a median elevation and is extended apically as a more or less truncate lobe (Figs. 1-6, 43-50). The head (Figs. 1-6) is sublenticular or somewhat elongate and has prominent, hairy eyes and three ocelli. Length of the head (LH) is measured from the vertex crest to the median apical margin of the clypeus, width of the head (WH) at the maximum point, including the eyes; both of these measurements are made at full frontal view. Width of the front (WF) is measured at its minimum point, usually about the middle of the eyes. The height of the eye (HE) is measured at its maximum in lateral aspect. As an indication of ocellar size, I have measured the transverse diameter of the anterior ocellus (DAO) and compared this with the width of the front; in species with the smallest ocelli DAO is about .10 X WF, while in species with the largest ocelli DAO is nearly .40 X WF. The ocello-ocular line (OOL) is the shortest distance from the eye tops to the lateral ocellus, measured by looking directly down upon it with the specimen appropriately tilted. This measurement is frequently compared to the width of the ocellar triangle (WOT), which is simply the distance across (and including) the posterior ocelli. The front angle of the ocellar triangle varies interspecifically and provides an important means

of separating certain species. I have measured this by superimposing the right angle of a grid micrometer over the outer sides of the anterior and one lateral ocellus and determining whether the angle of the line extending to the other lateral ocellus is greater or less than a right angle. The occipital carina is obsolete dorsally except as otherwise noted. The antennae have 13 segments, of which the scape is much the largest. The relative length of the flagellum is of much importance, and in order to have an easily comparable measurement I have selected segment eleven (the antepenultimate) for measurement. In species with especially long antennae, this segment measures two or more times as long as wide, while in specimens with very short antennae it may actually be wider than long. This measurement is especially subject to error because of the tendency of the antennae to coil and because the segments are capable of some extension (specimens preserved in alcohol tend to give higher measurements).

The term thorax is here employed to mean the functional thorax or alitrunk. The pronotum is gradually expanded behind and shows little variation in the genus. On the mesonotum, the mesoscutum possesses well developed parapsidal furrows, while the more median notauli show much variation in degree of development; the scutellum has a basal transverse groove, a median elevated disc, and large lateral foveae. The propodeum shows much variation in length and measurements have been found useful. Its total length, from margin of metanotum to posterior rim (articulation with gaster) is compared with its maximum width, both these measurements being made in full dorsal view. In lateral view, the height of the propodeum is measured from the carina running forward from above the hind coxae. A single median carina and lateral carinae margining the disc are present in all species except as otherwise noted. The mesopleurum is oblique and elongate and is the source of useful taxonomic characters, though these are often subtle and difficult to express. At the top, just below the base of the hind wings, is a more or less well defined swelling, here called the mesopleural callus; this is subtended by a usually elongate impression; the remainder of the mesopleurum tends to be sculptured in various ways. The legs are slender and short-haired, and aside from slight differences in dimensions of the femora show no important specific differences. The tarsal claws normally have a single erect tooth, but this tooth may be extremely weak or (in several South American species) entirely absent. The fore wings (Figs. 51-62) have a

characteristic venation which shows little variation within the genus. The vein which extends beyond the origin of the basal and transverse median veins and is more or less in a straight line with the median vein is here termed the discoidal vein, the cell below it the discoidal cell. This vein may be well defined, weak, faintly indicated but unpigmented, or entirely absent. On the outer part of the wing there are a number of hyaline streaks which presumably mark the course of former veins; these are omitted from the figures, and I have found them of no particular value in classification. The hind wing has a single strong but short vein at the base and a strong jugal lobe. The length of the fore wing (LFW) is a useful measurement for size of the wasp, as total body length is difficult to measure accurately.

The term abdomen is here used to mean the gaster (true abdomen minus the propodeum) in the common manner of hymenopterists. The apical abdominal sternite or subgenital plate is of simple structure and usually somewhat truncate apically. The genitalia are highly characteristic of the genus and show very little variation within the genus (including also Old World species). Their typical form is shown in Figure 63. The parameres are deeply divided into a relatively broad outer arm and a more slender inner arm, the latter having much fewer setae. The volsellae are complex, with digitus and cuspus about as figured in all species, but looking very different from different points of view; at the base of the volsellae, medially, is a portion containing several strong radiating sulci, resembling a fan and therefore here termed the vannus (absent in one species). The aedoeagus is normally flat, somewhat bottle-shaped, and of simple structure, though in one species it is compressed and of more complex structure (Fig. 67).

Female. — Females are completely apterous and without tegulae, and show corresponding reductions in the thorax (Reid, 1941, figured and discussed the thorax of the related genus *Mangesia*, from Africa). They are nearly sightless, usually pale in color, and clearly modified for a hypogaeic existence. They vary in length from 1.8 to 6.5 mm., the females of a given species being (on the average) considerably smaller than the males. The mandibles have three or four teeth, sometimes only two teeth which are prominent, the third being very small (Figs. 33-42). The clypeus is very broad, truncate or somewhat emarginate, and has a median ridge. The scape is large, the flagellum short and somewhat thickened from the base, the flagellar segments (except the

last) broader than long; the antennae are much alike in all species. The eyes consist of a single facet on each side; in some of the smaller species the eyes cannot be seen at all, but it is difficult to be sure that the facet is not there but indistinguishable from the surface sculpturing. The head itself is subquadrate, slightly longer than wide. Length of the head (LH) is measured from median apex of clypeus to median crest of vertex in full frontal view. Width of the head (WH) is measured at the mid-point of LH; usually the head is not wider elsewhere than at this point, but in a few species it is slightly wider anteriorly than here. The occipital carina is obsolete dorsally except in one species as noted. Ocelli are absent.

The length of the thorax (LT), again including the propodeum, is measured from the anterior end of the pronotal disc (omitting the depressed collar) to the posterior end of the propodeum. The pronotum is large and is longer than broad; its median length is also measured without consideration of the collar, while its width is measured posteriorly, across the rather prominent shoulder-like corners. The mesonotum is strongly depressed anteriorly, fitting against the pronotum; this is the mesoscutum according to Reid (1941). The remainder of the mesonotum, although called the mesonotum in the text, is said by Reid to be the scutellum; it is triangular, somewhat pointed posteriorly, and is measured at its maximum points (anteriorly for width, medially for length, omitting the depressed portion). The mesopleura are large and have dorsal portions which flank the mesonotum; these round off laterally and form much the widest part of the thorax. The propodeum is strongly narrowed anteriorly to a pair of pointed processes which embrace the posterior point of the mesonotum; the disc is subcarinate laterally, the carinae being interrupted at one point by the spiracles; the disc is without strong sculpturing of any kind. The legs are short-haired and without spines except for the middle tibiae and tarsi, which are strongly spinose. The abdomen (= gaster) is sessile, subfusiform, and terminates in a short sting which is embraced by stout sting-sheaths.

ALPHABETICAL LIST OF ABBREVIATIONS USED IN TEXT

Ant. 11: antennal segment eleven (antepenultimate)
DAO: diameter of anterior ocellus (transversely)
HE: height of eye (maximum, lateral view)

L: length
LFW: length of fore wing
LH: length of head (full front view, including clypeus but not mouthparts)
LT: length of thorax (excluding collar but including propodeum)
OOL: ocello-ocular line
W: width
WF: width of front (at minimum point)
WH: width of head (full frontal view; see preceding section for details)
WOT: width of ocellar triangle (including lateral ocelli)
X: times

Genus PSEUDISOBRACHIUM Kieffer

Isobrachium Ashmead, 1893, Bull. U. S. Nat. Mus., 45: 35-40. [*Nec* Förster, 1856; misidentification.]

Pseudisobrachium Kieffer, 1904, Ann. Mus. Civ. Stor. Nat. Genova, (3a)1: 368. [Type species *P. laticeps* Kieffer (♀, Bolivia); designated by Kieffer, 1906, in André, Spec. Hym. Eur., 9: 297.]

Monepyris Kieffer, 1905, Ann. Sci. Soc. Bruxelles, 29: 101, 124. [Type species *Epyris halidayi* Westwood (=*subeyaneum* Haliday) (♂, Europe); monobasic.] Placed in synonymy by Kieffer, 1906, *op. cit.*, p. 297.

Plutobethylus Kieffer, 1910, Ann. Soc. Ent. France, 79: 51. [Type species *P. distans* Kieffer (♂, Peru); original designation.] New synonymy.

Lyssepyris, Kieffer, 1913, Boll. Lab. Zool. Portici, 7: 108. [Type species *Holepyris flavicornis* Kieffer (♂, Nicaragua); monobasic.] New synonymy.

Xantepyris Kieffer, 1913, Boll. Lab. Zool. Portici, 7: 108. [Type species *Epyris flaviventris* Kieffer (♂, Texas); monobasic.] New synonymy.

Lissepyris Kieffer, 1914, Das Tierreich, 41: 236. Error for *Lyssepyris*.

Xanthepyris Kieffer, 1914, Das Tierreich, 41: 417. Correction of typographical error.

Parisobrachium Kieffer, 1914, Das Tierreich, 41: 424. [Type species *Rhabdepyris* (?) *albipes* Kieffer (♂, Paraguay); monobasic.] New synonymy.

Generic characters. — *Male.* Mandibles with four or five (rarely three) teeth; clypeus with a median carina, usually truncate but occasionally dentate or emarginate apically; eyes with abundant short hair; antennae simple, 13-segmented, the flagellar pubescence appressed or suberect, never erect and bristling. Pronotum without transverse grooves or carina; scutellum with a basal transverse groove and with lateral fovae; propodeum with

a single median carina (rarely obsolete) and without a carina margining the dorsal surface posteriorly. Tarsal claws with a single tooth which may be very weak or occasionally absent. Wings with basal vein reaching subcosta well basad of stigma; discoidal vein present or absent, discoidal cell occasionally fully outlined by weak veins. Genitalia with parameres deeply divided into two separate arms; basis volsellaris with vannus present (except rarely); aedoeagus simple and depressed (with rare exceptions). *Female.* Mandibles with three or four teeth; clypeus with a median carina, truncate or emarginate apically; eyes each consisting of a single facet, sometimes indistinct; ocelli absent; head longer than broad; antennae short, 13-segmented, flagellum somewhat thickened. Wings and tegulae absent; pronotum longer than broad; mesonotum subtriangulate, subacute behind; propodeum gradually narrowed anteriorly to a pair of points which flank the posterior point of the mesonotum, the thorax much constricted laterally at the junction of the propodeum and mesonotum; mesopleura large, bulging laterally; middle tibiae stout and strongly spined, middle tarsi also somewhat spinose, legs otherwise short-haired but not spinose.

Remarks. I have seen no specimens of the type species of *Pseudisobrachium*, but have no reason to question that it belongs to the genus as here understood. Through the courtesy of Dr. G. Steinbach of the Zoologisches Museum der Humboldt-Universität zu Berlin, I have had an opportunity to study the type specimen of the type species of *Plutobethylus* Kieffer. This species is a typical *Pseudisobrachium* in every respect other than the tarsal claws, which are simple as indicated by Kieffer. Since the tooth on the tarsal claws is very minute and difficult to see in some Nearctic species, it seems to me a mistake to emphasize this character to that extent.

With the aid of Dr. R. L. Doutt, of the University of California at Albany, I have been able to borrow for study the type specimen of *flavicornis* Kieffer, type of the genus *Lyssepyris* Kieffer. This species is a perfectly typical *Pseudisobrachium* and in fact will run to that genus in Kieffer's key to genera. In his original description of *flavicornis*, Kieffer states clearly that the scutellum has a transverse furrow at the base. But in order to properly run out *Lyssepyris* in his key, one has to assume the scutellum has two pits at the base!

Xanthepyris Kieffer, based on *flaviventris* Kieffer, from Texas, is also a synonym of *Pseudisobrachium*. In this instance I am

indebted to Mr. Karl-Johan Heqvist of the Naturhistoriska Riksmuseet of Stockholm for sending me the type of *flaviventris*. *Xanthepyris* was described as having two unconnected pits at the base of the scutellum. The type of *flariventris* is pinned through the mesonotum in such a way that the structure of the base of the scutellum is difficult to observe. However, the species is a not uncommon one and in every way a typical *Pseudisobrachium;* in other specimens the scutellum can be seen to have a transverse groove at the base.

Parisobrachium Kieffer, 1914, based on a single species from Paraguay, is said to differ from *Pseudisobrachium* in lacking a discoidal vein and in having three propodeal carinae (although Kieffer for some reason places the genus in the Epyrini rather than the Pristocerini). Dr. Delfa Guiglia, of the Museo Civico di Storia Naturale, Genoa, Italy, has been kind enough to send me a cotype of the type species, *albipes*, and I find it to be a rather typical *Pseudisobrachium*. Study of the North American species shows that the presence or absence of a discoidal vein is of little significance in this complex, and the propodeum of *albipes* differs scarcely at all from that of several other species.

Protisobrachium Benoit, 1957, based on males of two species from the Congo, is said to differ from *Pseudisobrachium* in lacking a discoidal vein, while *Afrisobrachium* Benoit, 1957, also based on males of two Congo species, is said to differ in having the basal vein meeting the tip of the pterostigma. I am inclined to question the generic value of these characters, but in the absence of material I prefer to make no definite disposition of these names.

KEY TO SPECIES OF PSEUDISOBRACHIUM

Males

1. Mandibles with five teeth, the basal three teeth similar in size and shape, or sometimes the basal tooth slightly thicker and more rounded than the third and fourth teeth (Figs. 7-18) 2

   Mandibles with four teeth, rarely with three, occasionally with five, in the latter case the basal tooth broad and curving gradually into the inner mandibular margin and the third and fourth teeth very small (Figs. 19-32) 24

2. Abdomen with a distinct, slender petiole (Fig. 68); discoidal vein arising far down on the transverse median vein (Fig. 52); vannus of genitalia wholly wanting (Fig. 65) (Panama) ..... 43. *petiolatum* n. sp.

   Abdomen sessile; discoidal vein arising near top of transverse median vein, or absent; vannus present, with radiating ridges (Figs. 63-64) 3

3. Relatively robust species, propodeum short, measuring less than 1.5 times as long as broad, in lateral view less than 2.5 times as long as high 4
Very slender species, propodeum in particular very elongate, measuring at least 1.5 times as long as broad, in lateral view at least 2.5 times as long as high (*occidentale* group) 14

4. Mesopleural callus convex, strongly polished, non-alutaceous or nearly so, contrasting to the remainder of the mesopleurum, which is alutaceous and/or punctate 5
Mesopleural callus alutaceous, not especially prominent or strongly contrasting to the remainder of the mesopleurum, which is also alutaceous (in one species the whole mesopleurum is convex and shining, the callus not well differentiated) (*obscurum* group) 18

5. Aedoeagus compressed, of complex structure (Fig. 67); mesonotum, anteriorly between the notauli, very strongly polished, with only a few punctures; propodeum short, rugose (eastern U. S.) ..... 44. *anomalum* n. sp.
Aedoeagus depressed, simple (Fig. 63); other characters not entirely as above (*crassum* group) 6

6. Front strongly shining, barely if at all alutaceous, with very strong punctures 7
Front weakly to moderately shining, alutaceous, punctures not especially strong 11

7. Ocelli very large, DAO at least .25 X WF, OOL not much if any more than half WOT; wings very pale; abdomen rufous (Texas) ..... 5. *crassum* n. sp.
Ocelli smaller, DAO less than .2 X WF, OOL subequal to or greater than WOT; wing veins and abdomen dark 8

8. Antennae medium to dark brown; notauli strongly impressed for most of length of mesoscutum 9
Antennae light reddish-brown; notauli impressed on anterior half of mesoscutum only 10

9. Mandibles broad apically and with the teeth large and subequal (Fig. 9); eyes large, bulging laterally, removed from vertex crest by a distance slightly less than their own height; WF 1.27 X HE (Central Mexico) ..... 1. *michenci* n. sp.
Mandibles with the basal teeth smaller and more rounded than the apical tooth (Fig. 10); eyes small, not bulging, removed from vertex crest by a distance greater than their own height; WF 1.6 X HE (central and southern Mexico) ..... 2. *blomi* n. sp.

10. Ocelli of moderate size, in a fairly broad triangle (OOL about .9 X WOT); legs (except front coxae) bright straw-yellow (southern Mexico) ..... 3. *perpunctatum* n. sp.
Ocelli small, in a compact triangle far removed from the eyes (OOL 1.3-1.45 X WOT); legs brown, paler apically (Mexico and Guatemala) ..... 4. *dalmati* n. sp.

11. Clypeus unusually broad, its lateral angles slightly produced (Fig. 43); propodeal disc shining, with rather strong transverse striae (Panama) ..... 9. *clypeatum* n. sp.

Clypeus with its lateral angles obtuse, not produced; propodeal disc less strongly shining and with less definite striae, if any 12

12. Clypeus with a median tooth (Fig. 47); basal three teeth of mandibles small, forming a unit which is somewhat set off from the other teeth (Fig. 12); propodeum with transverse striae (Costa Rica) ..... 8. *cooperi* n. sp.

Clypeus without a median tooth; mandibular dentition not as above; sculpturing of propodeum weaker and with little tendency to form striae 13

13. Clypeus wide at the base, its sides strongly converging (Fig. 44); ocelli far removed from eyes (OOL 1.56-1.75 X WOT); antennae shorter (segment eleven less than twice as long as thick) (Panama and Costa Rica) ..... 7. *rettenmeyeri* n. sp.

Clypeus narrower basally, its sides less strongly convergent (Fig. 48); ocelli less far removed from eyes (OOL 1.0-1.3 X WOT); antennae longer (segment eleven at least twice as long as thick) (Texas) ..... 6. *texanum* n. sp.

14. Front very broad in relation to eye height (WF 1.4-1.56 X HE); ocelli small, far removed from eyes (OOL 1.1-1.4 X WOT); antennae rather short, segment eleven less than 1.4 X as long as thick (central Mexico) ..... 14. *brunneum* n. sp.

Front narrower (WF .90-1.5 X HE); ocelli not so far removed from eyes (OOL .43-1.12 X WOT); in specimens having the front rather broad and the ocelli fairly far removed from the eyes (some specimens of *occidentale*) the antennae are much longer, segment eleven at least 1.5 X as long as thick 15

15. Front angle of ocellar triangle slightly greater than a right angle; antennae short, segment eleven not more than 1.5 X as long as thick; very small, maximum wing length 2.1 mm. (Texas) ..... 12. *matthewsi* n. sp.

Front angle of ocellar triangle slightly less than a right angle; antennae longer, segment eleven from 1.4-2.6 X as long as thick; length of fore wing 2.1 to 5.0 mm. 16

16. Front very narrow, WF less than HE (.90-.95 X HE); body castaneous; distance from eye tops to vertex crest equal to less than half HE (southern California) ..... 11. *castaneum* n. sp.

Front somewhat broader, WF subequal to or greater than HE; body dark brownish-fuscous; distance from eye tops to vertex crest equal to more than half HE. 17

17. Larger, minimum wing length 2.8 mm.; front of moderate breadth (WF 1.13-1.53 X HE) (California and Arizona) ..... 10. *occidentale* n. sp.

Smaller, maximum wing length 2.7 mm.; front narrow (WF .97-1.42 X HE) (central Mexico) ..... 13. *nigriculum* n. sp.

18. Anterior part of mesopleurum with many strong punctures; wing veins and stigma brown, discoidal vein present and weakly pigmented; fore wing at least 2.9 mm. long 19
Anterior part of mesopleurum without strong punctures; wing veins light brown to colorless; minute species, LFW 1.6-3.1 mm. 20

19. Antennae and legs brown; eyes small, removed from vertex crest by a distance about equal to their own height; OOL much exceeding WOT (Mexico) ..... 15. *michoacanum* n. sp.
Antennae ferruginous, legs bright castaneous; eyes larger, removed from vertex by a distance much less than their own height; OOL slightly if at all exceeding WOT (South Carolina and Florida) ..... 16. *carolinianum* n. sp.

20. Front broad and eyes small (WF at least 1.4 X HE); ocelli very small (DAO about .15 X WF) 21
Front narrow and eyes large (WF not over 1.3 X HE); ocelli enlarged at least slightly (DAO .18-.26 X WF) 23

21. Thoracic dorsum and pleura strongly shining, very weakly alutaceous; legs and antennae dark brown (New Mexico) ..... 17. *gibbosum* n. sp.
Thoracic dorsum and pleura alutaceous, weakly to moderately shining; legs and antennae yellowish or pale castaneous 22

22. OOL and WOT subequal; discoidal vein of fore wing unpigmented (Arizona) ..... 18. *otiosum* n. sp.
OOL much greater than WOT; discoidal vein of fore wing present as a pigmented streak (Nicaragua) ..... 19. *testaceipes* Kieffer

23. Ocelli in a close triangle, front angle less than a right angle; front virtually impunctate (Arizona) ..... 20. *pallidum* n. sp.
Ocelli in a broad triangle, front angle greater than a right angle; front with small though usually quite distinct punctures (W. Texas and Arizona to Chihuahua and Baja California) ..... 21. *obscurum* n. sp.

24. Mandibles with five teeth, though the third and fourth teeth are very small and may be partially fused (Figs. 19-21) 25
Mandibles with only three or four teeth 28

25. Discoidal vein of fore wing present, well pigmented; anterior part of mesopleurum strongly punctate; large species with relatively long antennae (segment eleven at least 1.5 X as long as thick (*prolongatum* group) 26
Discoidal vein of fore wing absent or at least unpigmented; mesopleurum obscurely punctate; minute, deserticolous species with shorter antennae than above 20

26. Front relatively broad and eyes relatively small (WF 1.5-1.8 X HE, .66-.73 X WH); ocelli small (DAO not over .15 X WF) (southern Canada and northern United States, south in Appalachians to Carolinas) ..... 24. *prolongatum* (Provancher)

Front relatively narrow and eyes relatively large (WF .90-1.25 X HE, .52-.62 X WH); ocelli somewhat enlarged (DAO at least .18 X WF) 27

27. Mesoscutum strongly shining, non-alutaceous, punctures small but very distinct, more crowded laterally; ocelli very large, anterior ocellus measuring nearly .2 mm. in diameter (central Mexico) ..... 22. *aztecum* n. sp.

Mesoscutum moderately shining, alutaceous at least on the sides, punctures present but less pronounced than above; ocelli of moderate size, anterior ocellus less than .15 mm. in diameter (eastern United States) ..... 23. *arenarium* n. sp.

28. Mandibles slender and with only three teeth, the basal tooth large, somewhat rounded (Fig. 32); propodeum with some weak longitudinal ridges medio-basally, but without a single distinct median carina (Panama) ..... 46. *superbum* n. sp.

Mandibles with four teeth, third tooth often rather small, very rarely absent, but when so basal tooth not as above (Figs. 22-31); propodeum with a distinct median carina 29

29. Species with small eyes and ocelli (WF more than 1.4 X HE; ocelli not or only slightly enlarged) (Figs. 1-4); vertex elevated far above eye tops, distance from eye tops to vertex crest commonly subequal to or greater than eye height (*carbonarium* group) ..... 30[3]

Species with relatively large eyes, ocelli also usually enlarged (WF less than 1.4 X HE) (Figs. 5-6); vertex elevated above eye tops a distance usually considerably less than eye height (*rufiventre* group) ..... 41[3]

30. Front and thoracic dorsum and pleura (including the weakly defined mesopleural callus) so strongly and regularly alutaceous as to appear beaded, punctures barely if at all evident; OOL at least nearly 1.5 WOT (eastern United States) ..... 25. *carbonarium* (Ashmead)

Front and thoracic dorsum and pleura not beaded in appearance, merely somewhat alutaceous and often punctate 31

31. Elongate species, antennae quite long and slender (segment eleven at least 1.4 X as long as thick); either the propodeum is unusually elongate (over 1.5 X as long as wide) or the mesopleurum has large punctures anteriorly 32

More compact species, antennae only occasionally with segment eleven as much as 1.4 X as long as thick, if so other characters not as above 33

[3] In doubtful cases rely upon a careful determination of the WF/HE ratio; species in which the individual variation embraces the ratio 1.4 will key out on both sides of this couplet.

32. Eyes bulging, head narrowed behind eyes and vertex rather narrowly rounded (Fig. 2); OOL and WOT subequal; mesopleurum without well-defined punctures (California) ..... 31. *persimile* n. sp.
Eyes not bulging, head wide behind eyes and vertex very broadly rounded; OOL much exceeding WOT; mesopleurum with some coarse punctures anteriorly (Washington and British Columbia east to Maritimes and south to North Carolina) ..... 24. *prolongatum* (Provancher)

33. All four mandibular teeth projecting and tooth-like, third and fourth teeth subequal or fourth somewhat the larger (Figs. 24-26); small species occurring in southwestern United States, Mexico, and Central America 34
Basal tooth of mandibles very different from the small (rarely absent) third tooth, broad and with its inner margin arching into the inner mandibular margin (Figs. 23, 27, 28) 36

34. Front obscurely if at all punctate; eyes bulging, vertex narrowly rounded off far above eye tops (Fig. 4); LFW 1.3-2.0 mm. ..... 28. *minutissimum* n. sp.
Front with shallow but rather distinct punctures; eyes less bulging and vertex much more broadly rounded; LFW 2.3-3.0 mm 35

35. Legs (except front coxae) light yellowish-brown; wing veins light brown to almost colorless; OOL subequal to WOT (Arizona) ..... 30. *navajo* n. sp.
Legs brown, wing veins brown; OOL much exceeding WOT (Arizona and New Mexico) ..... 27. *minimum* n. sp.

36. Antennae relatively smooth (as, for example, in *flavinervis*), setulae on flagellum pale, minute, subappressed, erect setae on flagellum short and inconspicuous; ocellar triangle rather broad 37
Antennae roughly pubescent (as, for example, in *prolongatum*), flagellar setulae suberect, some of them .3 X as long as width of flagellum, erect setae numerous and some of them usually half as long as width of flagellum 39

37. Ocelli small (DAO .12-.15 X WF); front very broad (WF at least about 1.5 X HE) (Fig. 3); clypeus rather broadly truncate apically (Fig. 50); OOL at least equal to WOT 38
Ocelli somewhat enlarged (DAO at least .19 X WF); front generally narrower and clypeus more narrowly truncate than above; OOL much less than WOT 48

38. WF at least 1.75 X HE; vertex elevated above eye tops a distance about equal to eye height (Fig. 3) (Durango) ..... 32. *hurdi* n. sp.
WF not more than about 1.5 X HE; vertex elevated above eye tops a distance equal to about .8 X HE (New Mexico) ..... 33. *krombeini* n. sp.

39. Ocelli small (DAO not more than .16 X WF), anterior ocellus situated above an imaginary line drawn between eye tops (Fig. 1); discoidal vein of fore wing present, pigmented for a short distance (Fig. 58) 40

Ocelli somewhat enlarged and anterior ocellus situated on or touching an imaginary line drawn between eye tops (Fig. 5), or if not, then the discoidal vein is absent (Fig. 60) 43

40. Mesopleural callus shining, barely alutaceous, anterior part of mesopleurum with coarse punctures (Nicaragua and Honduras) ..... 29. *flavicornis* (Kieffer)

Mesopleural callus alutaceous, slightly convex but not otherwise notably contrasting to remainder of mesopleurum, which is weakly to moderately punctate (eastern United States) ..... 26. *ashmeadi* n. sp.

41. Front angle of ocellar triangle (as measured from outer sides of ocelli) less than a right angle (as in Figs. 4, 5) 42

Ocelli in a broad triangle, front angle greater than a right angle (as in Fig. 6) 48

42. Thoracic dorsum strongly polished, mostly if not entirely non-alutaceous, contrasting with the front, which is distinctly alutaceous; mesopleurum also strongly shining; mesoscutum with small, sharply defined, rather evenly spaced punctures (Arizona) ..... 38. *apache* n. sp.

Thoracic dorsum not wholly strongly polished, always in large part alutaceous, not strongly contrasting to front 43

43. Fore wing with discoidal vein present as a distinctly pigmented streak (Fig. 59); wings with setulae dark, veins brown 44

Fore wing with discoidal vein absent or merely indicated by an unpigmented line (Figs. 60-61); wings pale, veins light brown to colorless 46

44. A minute species, LFW 1.6-2.5 mm.; legs and antennae brownish; antennae of moderate length, segment eleven about 1.2 X as long as thick; pubescence of flagellum unusually coarse and suberect (Louisiana and Arkansas) ..... 36. *pusillum* n. sp.

Larger, LFW 2.1-3.7 mm.; legs and antennae light yellowish or reddish brown, or if darker brown (some specimens of *comanche*) antennae longer than above and flagellar pubescence less coarse 45

45. Vertex narrowly rounded, eyes strongly bulging laterally; an elongate species, propodeum, in lateral view, much more than twice as long as high, thorax, in lateral view, more than 3 X as long as its maximum height (Arizona) ..... 37. *comanche* n. sp.

Vertex more broadly rounded, eyes less strongly bulging (Fig. 5); body compact, propodeum about twice as long as high, thorax less than 3 X as long as its maximum height (eastern United States) ..... 35. *rufiventre* (Ashmead)

46. Mesopleural callus well differentiated, convex and polished, remainder of mesopleurum somewhat shining and/or punctate; antennae short (segment eleven 0.9-1.2 X as long as thick); vertex broad, almost straight across (eastern United States) ..... 34. *flaviventre* (Kieffer)

Mesopleural callus weakly differentiated, not strongly convex and polished; antennae of variable length, often longer than above 47

47. Clypeus emarginate apically (Fig. 49); ocelli not much enlarged (DAO about .17 X WF); body dark brown to black (Texas) ..... 40. *emarginatum* n. sp.
Clypeus truncate apically (Fig. 45); ocelli usually larger than above (Texas to California) ..... 39. *fontsi* n. sp.

48. Front with small but usually very clearly defined punctures; eyes relatively smooth, the setae being shorter and sparser than is usual in this genus; wing veins nearly colorless; antennae various shades of yellow or light castaneous, very smooth (western Texas to California and Baja California) ..... 42. *flavinervis* Fouts
Front obscurely if at all punctate; eyes about as hairy as usual in the genus; wing veins light brown (Nebraska to eastern Texas and Mexico) 49

49. Ocelli of moderate size (DAO .19-.24 X WF); abdomen brown like head and thorax (Nebraska to Nuevo Leon) 41. *rectangulatum* n. sp.
Ocelli extremely large (DAO .33-.37 X WF); abdomen rufous, contrasting to head and thorax (lower Rio Grande Valley of Texas) ..... 43. *macrops* n. sp.

Females

1. Mandibles with four well defined teeth (Figs. 33-36) 2
Mandibles with three teeth, sometimes with only two large, well-defined teeth, sometimes with a rudimentary fourth tooth indicated by an undulation on the inner mandibular margin (Figs. 37-42) 8

2. Basal tooth of mandibles large and projecting (Figs. 33-34); entire body dark brown to almost black 3
Basal two teeth of mandibles small and drawn back along inner margin of mandibles (Figs. 35-36); abdomen, at least, pale 4

3. Very large, length of head much over 1 mm.; median carina of clypeus continued as a short apical tooth; head 1.15 X as long as wide, occipital carina obsolete dorsally (Panama) ..... 47. *gigas* n. sp.
Smaller, head length well under 1 mm.; clypeus without a median apical tooth; head 1.3 X as long as wide, occipital carina complete dorsally (Panama) ..... 48. *zeteki* n. sp.

4. Head and thorax nearly black, eye spots contrastingly pale, abdomen contrastingly rufous; entire head with strong, rather evenly spaced punctures, between which it is strongly polished (Guatemala) ..... 49. *manni* n. sp.
Head and thorax pale to medium brown, only slightly if at all darker than abdomen, eyes less strongly contrasting to head color 5

5. Anterior part of front and sides of head alutaceous and/or striato-punctate; generally larger than below, head length .6 mm. or more 6
Head not at all striato-punctate and not or barely alutaceous, strongly shining; minute species, head length .4-.63 mm. 7

6. Head slightly, gradually narrowed behind, anterior part of front alutaceous but not or only slightly striato-punctate; pronotal disc elongate, about 1.6 X as long as its posterior width (Utah, California) ..... 50. *paucipunctatum* Fouts

Head parallel-sided or very slightly bulged near the middle, anterior part distinctly striato-punctate laterally and dorsally; pronotal disc about 1.4 X as long as its posterior width (California, Arizona) ..... 10. ? *occidentale* n. sp.

7. An unusually slender species, head 1.42 X as long as wide, mesonotum about twice as long as wide; head punctures separated, for the most part, by about twice their own diameters (West Texas) ..... 12. ? *matthewsi* n. sp.

A somewhat stockier species, head 1.35 X as long as wide, mesonotum 1.4 X as long as wide; head punctures separated, for the most part, by about their own diameters (southwestern United States) ..... 21. ? *obscurum* n. sp.

8. Basal tooth of mandibles large, strongly projecting (Fig. 42); clypeal carina slightly produced beyond apical margin, which is concave; head and thorax deep brown, eyes white (Costa Rica) ..... 51. *costaricanum* n. sp.

Basal tooth of mandibles small, drawn back along inner margin of mandible; other characters not as above 9

9. Head strongly striato-punctate, at least antero-laterally; head parallel-sided or sides weakly convex, LH 1.1-1.3 X WH; generally larger and darker species, LH usually over .8 mm. (rarely down to .68 mm.) 10

Head not or very weakly striato-punctate (if rather evidently so, LH more than 1.3 X WH and sides of head weakly, gradually convergent behind); generally smaller species of paler coloration, LH not over .8 mm. 11

10. Disc of propodeum strongly shining, barely if at all alutaceous, punctures small and confined to extreme sides; head 1.2-1.3 X as long as wide (southern Canada and northern United States, south to North Carolina) ..... 24. *prolongatum* (Provancher)

Disc of propodeum moderately shining, evidently alutaceous, punctures on sides fairly strong, punctate parts of disc equal in area to impunctate median band; head about 1.15 X as long as wide (eastern United States ..... 23. ? *arenarium* n. sp.

11. Punctures of front very numerous, separated at least in part by no more than their own diameters (except medially), anteriorly decidedly crowded; front usually somewhat alutaceous, at least in part, under side of head often rather strongly alutaceous 12

Punctures of front sparse, separated for the most part by more than their own diameters; front strongly shining, not at all alutaceous, under side of head somewhat alutaceous or not 16

12. Length of head not over .6 mm.; front with punctures somewhat less crowded than below 13
Length of head generally over .6 mm.; front usually somewhat darker and with punctures relatively more crowded than above 14

13. Front shining, weakly alutaceous, with punctures somewhat more evenly distributed than below; LH 1.22-1.35 X WH (eastern United States) ..... 34. ? *flaviventre* (Kieffer)
Front conspicuously alutaceous, in fact obscurely striate anteriorly, punctures rather sparse posteriorly and much more crowded anteriorly; LH 1.4 X WH (southwestern United States) ..... 42. ? *flavinervis* Fouts

14. Head rather elongate, LH 1.3-1.4 X WH, sides of head weakly, gradually convergent behind (eastern United States) ..... 25. ? *carbonarium* n. sp.
LH 1.1-1.25 X WH 15

15. Head yellowish-brown; front unusually flat, punctures relatively weak (Pacific states) ..... 31. ? *persimile* n. sp.
Head ferrugino-castaneous; front not especially flat, punctures strong (eastern United States) ..... 35. *rufiventre* (Ashmead)

16. Punctures of front large and distinct; LH .47-.53 mm. (eastern United States) ..... 26. ? *ashmeadi* n. sp.
Punctures of head very small and shallow; LH about .4 mm. (Arkansas) ..... 36. ? *pusillum* n. sp.

Crassum Species-group

The males of this group have a relatively compact body form, the propodeum being distinctly shorter and higher than in the *occidentale* group. The most distinctive feature of the group is the convex, prominent, shining and non-alutaceous mesopleural callus, which contrasts strongly with the remainder of this sclerite. The mandibles are five-toothed; in some species the basal tooth is somewhat thicker and more rounded than the two following teeth, approaching the condition in the *prolongatum* group. The group falls readily into two subgroups: in one the head and thoracic dorsum are shining and strongly punctate; in the other these areas are dull, alutaceous, and weakly if at all punctate. Each of these subgroups has several species in Central America and Mexico and a single species in southern Texas. The compact form and relatively large size of species of this group, the full mandibular dentition, the variation in the shape of the clypeus, the complete notauli of some species, and other characters suggest that this may be the most primitive of the several species groups (i.e., closest to related genera such as *Pristocera, Propristocera,* and *Cleistepyris*).

No females can presently be assigned to this group with any real certainty. I would expect the females to have relatively broad mandibles, probably with four strong teeth. Two species described later in the paper, *gigas* and *zeteki*, have mandibles of this type and may represent females of this group. Another species, *manni*, may or may not go with this group.

TABLE I

Species and locality	No.	LFW	WF/HE	OOL/WOT	DAO/WF	Ant. 11 L/W
crassum						
Brownsville, Texas	3	3.9 (3.7-4.2)	1.11 (1.0-1.2)	.45 (.42-.50)	.29 (.27-.31)	1.5 (1.4-1.7)
San Antonio, Texas	1	3.3	1.32	.62	.25	1.4
micheneri						
Teziutlan, Puebla	1	4.9	1.27	1.32	.17	2.0
perpunctatum						
Tehuantepec, Oaxaca	1	3.1	1.23	.92	.18	1.6
blomi						
San Cristobal, Chiapas	1	5.3	1.6	1.70	.13	2.2
Cuernavaca, Morelos	2	4.3 (3.7-4.9)	1.57 (1.54-1.6)	1.81 (1.62-2.0)	.11	2.1
dalmati						
Yepocapa, Guatemala	1	4.0	1.5	1.45	.12	1.6
"Mexico"	1	4.9	1.54	1.32	.14	2.1
cooperi						
Turialba, Costa Rica	1	2.7	1.52	1.83	.12	1.9
clypeatum						
Canal Zone	1	3.1	1.34	1.60	.13	2.0
rettenmeyeri						
Canal Zone	3	2.6(2.2-2.9)	1.47 (1.43-1.5)	1.66 (1.56-1.75)	.13 (.11-.15)	1.7 (1.6-1.8)
Costa Rica	1	2.5	1.46	1.70	.11	1.7
texanum						
Brownsville, Texas	1	2.9	1.40	1.00	.16	2.0
Harlingen, Texas	5	3.4 (2.5-3.9)	1.41 (1.35-1.44)	1.22 (1.18-1.27)	.15 (.15-.16)	2.3 (2.2-2.5)
San Antonio, Texas	3	3.3 (3.2-3.3)	1.41 (1.38-1.44)	1.07 (1.05-1.11)	.16 (.15-.17)	2.2 (2.0-2.5)
Wharton, Texas	1	3.6	1.32	1.00	.16	2.3

1. Pseudisobrachium micheneri new species

Holotype. — ♂, 5 mi. NE of Teziutlan, Puebla, Mexico, 4700 feet, 27 June 1953 (Univ. Kansas Mex. Exped.) [KU].

Description. — Length 5.5 mm.; LFW 4.9 mm. Head and thorax black, abdomen dark brown, slightly paler on the sides of the first two segments, apical third of mandibles light brown, teeth rufous; antennae medium brown; legs brown, becoming paler apically; wings lightly infuscated, stigma dark brown, veins brown. Mandibles broad apically, with five strong, sharp teeth (Fig. 9). Clypeus truncate apically, its median carina weakly arched in profile. Antennae elongate, first four segments in a ratio of about 26:8:18:15, segment eleven twice as long as thick; pubescence of flagellum coarse, setulae almost half as long as thickness of segments, erect setae nearly as long as width of flagellum. WF .61 X WH, 1.27 X HE; ocelli of moderate size,

in a small, compact triangle far removed from eyes; DAO .17 X WF; OOL 1.32 X WOT. Eyes large, prominently bulging from sides of head, removed from vertex crest by a distance nearly equal to their height. Front shining, toward vertex a little less strongly shining and more evidently alutaceous, over whole surface with large punctures which for the most part are separated by less than their own diameters. Pronotum with rough, reticulate sculpturing except along the posterior margin, which is smooth and shining. Mesoscutum shining, with strong, close punctures; notauli deeply impressed for full length of mesoscutum; scutellum punctate except in extreme center, basal groove broad and shallow, lateral foveae small, shallow. Propodeum 1.45 X as long as broad, in lateral view about 2.3 X as long as high; spiracles elongate-elliptical, directed dorsad; entire surface, including sides, with strong reticulate sculpturing; median carina strong, extending full length of dorsal surface. Mesopleural callus strongly convex, smooth and shining, with a few punctures anteriorly; remainder of mesopleurum with strong, close-set punctures. Discoidal vein of fore wing strong, in fact the entire discoidal cell outlined by faintly pigmented lines.

Remarks. — Although this species is known from but one specimen, this specimen is distinctive in so many ways that there is little question that it is specifically distinct from its relatives *crassum* and *blomi*. The latter species is apparently diurnal, the former nocturnal. The ocelli of *micheneri* are slightly larger than those of *blomi* but much smaller than those of *crassum;* the wing veins and membrane are pigmented as in *blomi*. In general, I would expect *micheneri* to be a diurnal species, but it may fly in shaded situations or in periods of reduced sunlight. The broad mandibles, complete notauli, and fully outlined discoidal cell suggest the genus *Pristocera*.

2. Pseudisobrachium blomi new species

Holotype. — ♂, San Cristobal las Casas, Chiapas, Mexico, 7500 feet, 28 April 1959 (H. E. Evans) [MCZ, No. 30265].

Description. — Length 6.1 mm.; LFW 5.3 mm. Black, sides of base of abdomen suffused with dark reddish-brown; antennae dark brown; coxae dark brown, legs otherwise medium brown; apical two-thirds of mandibles dark ferruginous; wings lightly infuscated, stigma dark brown, veins brown. Mandibles with five teeth, basal tooth somewhat rounded (Fig. 10). Clypeus truncate apically. Antennae elongate, first four segments in a

ratio of about 32:5:22:20, segment eleven 2.2 X as long as thick; pubescence of flagellum short and dark, erect setae short and inconspicuous. WF .71 X WH, 1.6 X HE; ocelli small, in a compact triangle far removed from eyes, DAO .14 X WF, OOL 1.7 X WOT. Eyes relatively small, not notably bulging; distance from tops of eyes to vertex crest actually slightly greater than eye height. Front strongly shining, barely alutaceous, with many small but strong punctures which are separated from one another by from 1-2 times their own diameters. Anterior half of pronotum somewhat roughened, weakly shining, posterior half smoother, punctate, shining. Mesoscutum shining, barely alutaceous, with close-set punctures except along the median line; notauli strong on the anterior two-thirds, reaching posterior margin as weak impressions only. Scutellum shining, punctate, the basal groove moderately wide, shallow. Propodeum measuring 1.4 X as long as broad, in lateral view 2.3 X as long as high; spiracles elongate-elliptical, directed dorso-laterad; disc with reticulate sculpturing which is strongest anteriorly. Mesopleural callus prominent, shining and impunctate, remainder of mesopleurum with large, coarse punctures, the punctures smaller posteriorly and nearly absent along posterior margin below callus. Fore wing with discoidal vein long and strong, the discoidal cell in fact faintly outlined by pigmented lines.

Paratypes. — MEXICO: 1 ♂, 4 mi. NW Cuernavaca, Morelos, 7500 feet, 28 June 1959 (H. E. and M. A. Evans) [CU]; 1 ♂, 6 mi. N. Cuernavaca, Mor., 7500 feet, 15 Aug. 1954 (J. G. Chillcott) [CNC].

Variation. — The paratypes are smaller than the type but differ only slightly in body measurements (Table I). The mandibles are yellowish apically and the legs bright castaneous beyond the coxae rather than dull brown as in the type. Since the type and paratypes are from widely separated mountain systems, it is not surprising that there are differences between them. However, I question that any of these differences are of specific value.

Remarks. — This large and distinctive species is named for Franz Blom of San Cristobal las Casas, Chiapas, my host during a most profitable stay in that city in April 1959. The type was taken on low broad-leaf foliage in a pine forest just west of town at about 11 in the morning. The first paratype listed was taken at about the same altitude and in precisely the same ecological situation; it was taken at about 10 in the morning.

3. Pseudisobrachium perpunctatum new species

Holotype. — ♂, Tehuantepec, Oaxaca, Mexico, 9 Aug. 1958, 200 feet (E. G. Matthews) [MCZ, No. 30266].

Description. — Length 4.5 mm.; LFW 3.1 mm. Head and thorax black, abdomen reddish-brown, somewhat infuscated toward apex; antennae castaneous; legs wholly and uniformly light brown, except front coxae piceous; mandibles castaneous, teeth rufous; wings subhyaline, stigma brown, veins light brown. Mandibles with five teeth, about as figured for the preceding species. Clypeus truncate apically, its median elevation not arched in profile. Antennae rather long, first four segments in a ratio of about 21:5:13:12, segment eleven 1.6 X as long as thick; pubescence of flagellum pale, subappressed, erect setae pale, numerous, the longest ones slightly less than half as long as width of flagellum. WF .65 X WH, 1.23 X HE; ocelli somewhat enlarged, DAO .18 X WF, OOL .9 X WOT. Eyes rather large, removed from vertex crest by only .6 their height. Front shining, weakly alutaceous, with strong punctures which are separated by about or slightly less than their own diameters. Pronotum shining, strongly punctate, slightly roughened anteriorly. Mesoscutum strongly punctate except along midline; notauli strong on anterior .6, absent behind; scutellar disc sparsely punctate, basal groove straight, shallow. Propodeum measuring 1.35 X as long as broad, in lateral aspect measuring 2.4 X as long as high; spiracles elliptical, opening dorso-laterally; median carina short, extending only about half length of disc, which is covered with fine, somewhat irregular transverse striae. Mesopleural callus convex, non-alutaceous, strongly shining; remainder of mesopleurum alutaceous and punctate. Discoidal vein of fore wing weak, barely pigmented.

Remarks. — The one known specimen of this species was collected in a bare, arid field surrounded by irrigated land in the city of Tehuantepec; it came to the light of a Coleman lantern in the early evening.

4. Pseudisobrachium dalmati new species

Holotype. — ♂ [San Pedro] Yepocapa, Guatemala, [Dept. Chimaltenango, 4850 feet], May 1948 (H. T. Dalmat) [USNM, No. 65151].

Description. — Length 5.5 mm.; LFW 4.0 mm. Head and thorax black, abdomen dark reddish-brown suffused with lighter

brown basally and apically; scape brown, flagellum dull rufo-castaneous; front coxae black, legs otherwise medium brown except beyond apical two-thirds of tibiae, where they are pale yellow-brown; wings weakly infuscated, veins and stigma dark brown. Mandibles with five teeth, about as in the preceding two species. Clypeus truncate apically, its median elevation not arched in profile. Antennae rather short, scape especially short, with a ventral excavation which permits a strong elbowing of the antennae; first four segments in a ratio of about 22:6:15:15, segment three only 1.4 X as long as thick, segment eleven 1.6 X as long as thick; pubescence of flagellum light brown, subappressed, setae numerous, generally slightly less than half as long as width of flagellum. WF .68 X WH, 1.5 X HE; ocelli small, in a compact triangle far removed from eyes, DAO .12 X WF, OOL 1.45 X WOT. Eyes rather large, removed from vertex crest by a distance equal to about .9 their height. Front shining, non-alutaceous, with strong punctures which are separated from one another by less than their own diameters. Pronotum shining, strongly punctate, slightly roughened in front. Mesoscutum with the notauli strong on the anterior .6, absent behind; disc strongly punctate except on the median line; scutellar disc sparsely punctate. Propodeum short, in dorsal view measuring 1.25 X as long as broad, in lateral view 2.1 X as long as high; spiracles elliptical, directed dorsad; disc with strong reticulate sculpturing anteriorly and laterally, posteriorly with finer sculpturing which tends to form weak transverse ridges; median carina short. Mesopleural callus convex, strongly shining, non-alutaceous; remainder of mesopleurum also non-alutaceous, but wholly covered with very strong punctures. Fore wing with the discoidal vein longer than the basal vein, in fact the entire discoidal cell outlined by weakly pigmented veins.

Paratype. — 1 ♂, labeled simply "Mex." [ANSP].

Variation. — The single paratype is larger than the type, measuring about 6.5 mm. long, fore wing 4.9 mm. The abdomen is missing beyond the fourth segment. The legs are wholly dark except for a light spot at the inner apex of the middle and hind tibiae. The antennae are considerably longer than in the type, segment eleven measuring 2.1 X as long as broad. WF measures 1.54 X HE, OOL 1.32 X WOT. In other details the resemblance to the type is close.

Remarks. — I would judge this to be a diurnal species, as the ocelli are small and the colors dark. Its relationship to the preceding two species is close, but there are enough differences so that I feel confident that it is specifically distinct.

5. Pseudisobrachium crassum new species

Holotype. — ♂, Brownsville, Texas, Oct. 1942 (at light, E. S. Ross) [CAS].

Description. — Length 5.2 mm.; LFW 3.7 mm. Head and thorax dark brownish-fuscous, nearly black; abdomen bright reddish-brown; antennae ferruginous; coxae brownish, remainder of legs straw-yellow; wings subhyaline, stigma brown, veins amber. Mandibles with five teeth, the basal tooth somewhat thicker than the two rather small teeth next to it (Fig. 13). Apical margin of clypeus truncate; median carina not arched in profile. Antennae of moderate length; first four segments in a ratio of about 20:5:11:10, segment eleven 1.45 X as long as thick; pubescence of flagellum fine, pale, subappressed, erect setae short and inconspicuous. WF .6 X WH, 1.13 X HE; ocelli very large, DAO .27 X WF; OOL .5 X WOT; front angle of ocellar triangle slightly less than a right angle. Eyes removed from vertex crest by slightly more than half HE. Front strongly shining, only very weakly alutaceous, with strong punctures which are separated from one another by only slightly more than their own diameters. Pro- and mesonota also strongly shining and barely alutaceous, with strong punctures which are more widely separated between the notauli and absent from the center of the scutellum; notauli strongly impressed on anterior .7 of mesoscutum, absent behind. Propodeum 1.45 X as long as broad, in lateral view about twice as long as high; disc shining, alutaceous, median carina extending for only about half length of dorsal surface; spiracles elongate-elliptical, directed dorsad. Mesopleural callus strongly shining, non-alutaceous, but with a few punctures; remainder of mesopleurum weakly alutaceous, with small but distinct punctures. Discoidal vein of fore wing barely pigmented, about as long as basal vein.

Paratypes. — TEXAS: 1 ♂, same data as type [MCZ]; 1 ♂, Esperanza Ranch, Brownsville [USNM]; 1 ♂, San Antonio, Oct. 1942 (E. S. Ross) [CAS].

Variation. — The Brownsville paratypes approximate the type in size, but the San Antonio specimen is smaller (length of body 4.6 mm., of fore wing 3.3 mm). The latter specimen is a little less strongly punctate and has a relatively wider front and smaller ocelli (Table 1). The specimen from the Esperanza Ranch is the most strongly punctate of the lot, and in this specimen the notauli extend for only about half the length of the mesoscutum.

6. Pseudisobrachium texanum new species

Holotype. — ♂, Harlingen, Texas, 12 March 1945 (D. E. Hardy) [USNM, No. 65150].

Description. — Length 5.1 mm.; LFW 3.6 mm. Head and thorax black, abdomen dark brown, paler basally; mandibles light brown, teeth rufous; antennae dark brown, coxae dark brown, trochanters and femora medium brown, tibiae and tarsi light brown; wings subhyaline, stigma brown, veins light brown. Mandibles with five teeth, the three inner teeth subequal. Clypeus narrow, apical margin very slightly concave (Fig. 48). Antennae elongate, first four segments in a ratio of about 23:5:14:13, segment eleven 2.2 X as long as thick; pubescence of flagellum pale and subappressed, erect setae short, sparse. WF .68 X WH, 1.44 X HE; ocelli rather small, DAO .15 X WF, OOL 1.22 X WOT. Eye tops removed from vertex crest by a distance equal to about .6 HE. Front alutaceous, moderately shining, with shallow punctures which are separated from one another by slightly more than their own diameters. Pro- and mesonota alutaceous, moderately shining, punctures numerous but small and shallow; notauli strong on anterior half of mesoscutum; basal furrow and lateral foveae of scutellum shallow. Propodeum short, only about 1.35 X as long as broad, in lateral view about twice as long as high; spiracles elongate-elliptical; disc with a strong median carina, with reticulate sculpturing basally and laterally. Mesopleurum with the callus shining, very weakly alutaceous, remainder of mesopleurum with large punctures. Discoidal vein of fore wing not deeply pigmented, arising a short way down on the transverse median vein (Fig. 53).

Paratypes. — TEXAS: 4 ♂ ♂, same data as type, 12-15 March 1945 [USNM, MCZ]; 3 ♂ ♂, San Antonio, Aug. 1942 (at light, E. S. Ross) [CAS, MCZ]; 1 ♂, Brownsville, Sept. 1942 (E. S. Ross) [CAS]; 1 ♂, Wharton, 24 June 1917 (J. C. Bradley) [CU].

Variation. — Size range is from 3.3 to 5.1 mm., LFW 2.5 to 3.9 mm. There is little variation in head measurements in the type series (Table 1). The Wharton specimen has distinctly paler antennae, the flagellum being chestnut-brown.

7. Pseudisobrachium rettenmeyeri new species

Holotype. — ♂, Barro Colorado Island, Canal Zone, 28 March 1955 (Carl Rettenmeyer) [KU].

Description. — Length 4.2 mm.; fore wing 2.7 mm. Head black, thorax dark reddish-brown, abdomen slightly paler, especially the basal segments; mandibles yellowish, teeth rufous; clypeus light brown; antennae medium brown, including scape; legs, including front coxae, bright yellowish-brown; wings lightly infuscated, veins and stigma dark brown. Mandibles with five teeth, basal tooth slightly stronger than third and fourth teeth. Clypeus rather broad basally, sides tapering to a truncate apex of moderate width (Fig. 44). Antennae with first four segments in a ratio of about 19:4:13:11, segment eleven about 1.6 X as long as thick; pubescence of flagellum light brown, coarse, erect setae numerous, many of them over half as long as thickness of flagellum. WF .7 X WH, 1.48 X HE; ocelli small, DAO .13 X WF; OOL 1.67 X WOT. Distance from eye tops to vertex crest equal to about .8 HE. Front strongly alutaceous, weakly shining, punctures small and inconspicuous. Pro- and mesonota strongly alutaceous, weakly punctate; notauli strong on anterior .6 of mesoscutum. Propodeum 1.4 X as long as wide, in lateral view about twice as long as high; spiracles elliptical, directed dorso-laterad; disc weakly sculptured, the sculpturing showing a weak tendency to form transverse striations. Characters of the mesopleurum and of the fore wing as described for the following species.

Paratypes. — CANAL ZONE: 1 ♂, same data as type [KU]; 1 ♂, Pacora, 13 May 1953 (F. S. Blanton) [USNM]. COSTA RICA: 1 ♂, Hamburg Farm, April (C. W. Dodge) [MCZ].

Variation. — The Pacora specimen is slightly larger than the type (LFW 2.9 mm.), the Barro Colorado paratype very small (LFW 2.2 mm.). In the Pacora specimen the antennae are light brown, the scape yellow-brown. In all other respects the paratypes closely resemble the type.

8. Pseudisobrachium cooperi new species

Holotype. — ♂, Turrialba, Costa Rica, 22 June 1949 (K. W. Cooper) [USNM, No. 65152].

Description. — Length 3.7 mm.; LFW 2.7 mm. Head and thorax black, abdomen dark brown, suffused with lighter brown on sides basally; mandibles yellow, teeth rufous; antennae brown beyond the scape, which is black; front coxae black, legs otherwise light brown; wings lightly infuscated, veins and stigma dark brown. Mandibles with five teeth, basal three teeth small, subequal, forming a unit which is well set off from the apical two teeth (Fig. 12). Clypeus with a rounded, polished, median

apical prominence (Fig. 47). Antennae slender, first four segments in a ratio of about 20:4:11:10, segment eleven 1.9 X as long as thick, pubescence of flagellum coarse, semierect, erect setae unusually numerous. WF .69 X WH, 1.52 X HE; ocelli small, in a compact triangle far removed from eyes; DAO .12 X WF, OOL 1.83 X WOT. Vertex broadly rounded off far above tops of eyes, distance from eye tops to vertex crest nearly equal to HE. Front strongly alutaceous, weakly shining, with abundant shallow and rather inconspicuous punctures. Pro- and mesonota also strongly alutaceous and with abundant but shallow punctures; notauli present as thin lines on anterior .4 of mesoscutum. Propodeum about 1.4 X as long as wide, in lateral view about twice as long as high; spiracles elliptical, directed dorsad; median carina strong, dorsal surface with ridges which are reticulate basally, transverse posteriorly. Mesopleurum with the callus shining, barely alutaceous, remainder of this sclerite strongly alutaceous and with strong sculpturing. Discoidal vein of fore wing darkly pigmented, longer than basal vein, forming a straight line with median vein.

9. Pseudisobrachium clypeatum new species

Holotype. — ♂, Barro Colorado Island, Canal Zone, 4 Jan. 1929 (C. H. Curran) [AMNH].

Description. — Length 4.3 mm.; LFW 3.1 mm. Head black, thorax piceous, abdomen reddish-brown, sides of the basal segments suffused with light yellowish-brown; mandibles yellow, apices rufous; antennae brown; coxae, trochanters, and basal parts of femora bright straw-yellow; apices of femora and all of tibiae and tarsi yellow-brown; wings lightly infuscated, veins and stigma brown. Mandibles with five teeth, as shown in Figure 11. Clypeus broad apically, with a median tooth, the lateral angles prominent and slightly reflexed (Fig. 43). Antennae slender, first four segments in a ratio of about 24:5:15:14, segment eleven about twice as long as thick; pubescence of flagellum coarse, semierect, erect setae numerous, the longest ones over half as long as width of flagellum. WF .65 X WH, 1.34 X HE; ocelli small, far removed from eyes; DAO .13 X WF; OOL 1.6 X WOT. Vertex broadly rounded off far above the eye tops; distance from eye tops to vertex crest equal to about .8 HE. Front moderately shining, strongly alutaceous, with shallow punctures which are separated from one another by slightly more than their own diameters. Pro- and mesonota strongly alutaceous, weakly shining, with abundant shallow punctures;

notauli distinct on anterior .6 of mesoscutum; basal groove of scutellum rather broad and short, lateral foveae large, deep. Propodeum about 1.4 X as long as wide, in lateral view 2.2 X as long as high; spiracles elliptical, directed dorso-laterad; median carina rather long, dorsum of propodeum otherwise covered with delicate transverse ridges, shining. Mesopleural callus rather short and broad, remainder of mesopleurum strongly alutaceous and with strong punctures. Discoidal vein of fore wing interstitial with median vein, long, well-pigmented, in fact the discoidal cell completely outlined by weakly pigmented lines. Genitalia much as in other species and as shown in Figures 63, but both divisions of the parameres unusually slender.

Remarks. — There is a possibility that *zeteki,* described on a later page from a single female from Barro Colorado Island, is the female of *clypeatum.*

Occidentale Species-group

In this group are placed unusually elongate males possessing five-toothed mandibles. The mesopleural callus is often polished, but in general the callus is less well differentiated than in the *crassum* group. The species together range from central California to central Mexico and east to western Texas. There is very little structural variation within the group, and with one

TABLE II

Species and locality	No.	LFW	WF/HE	OOL/WOT	DAO/WF	Ant. II L/W
occidentale						
Tehama Co., Calif.	6	3.2 (2.4-3.7)	1.29 (1.23-1.36)	.71 (.54-.88)	.22 (.20-.24)	1.6 (1.4-1.8)
Mendocino Co., Calif.	2	3.6 (3.1-4.1)	1.26 (1.24-1.28)	.80 (.66-.94)	.19 (.18-.20)	2.0
Lake Co., Calif.	101	4.2 (3.4-4.9)	1.40 (1.29-1.50)	.94 (.86-1.0)	.19 (.18-.21)	2.1 (1.9-2.4)
Colusa Co., Calif.	4	4.0 (3.1-4.4)	1.20 (1.06-1.31)	.69 (.66-.70)	.25 (.20-.29)	1.9 (1.8-2.0)
Yolo Co., Calif.	64	3.4 (2.6-4.7)	1.28 (1.13-1.50)	.70 (.52-.88)	.22 (.17-.30)	1.8 (1.4-2.1)
Sacramento Co., Calif.	36	3.5 (2.8-4.2)	1.33 (1.05-1.45)	.73 (.43-.96)	.21 (.17-.31)	1.8 (1.5-2.0)
Solano Co., Calif.	2	4.1 (4.0-4.2)	1.14 (1.13-1.15)	.54	.28 (.26-.30)	2.2
Marin Co., Calif.	22	4.0 (3.1-4.3)	1.34 (1.21-1.47)	.96 (.85-1.1)	.19 (.17-.21)	2.2 (2.0-2.4)
Contra Costa Co., Calif.	1	2.8	1.53	.90	.17	1.6
Santa Clara Co., Calif.	3	4.6 (4.3-5.0)	1.28 (1.20-1.33)	.91 (.82-1.05)	.20 (.18-.23)	2.3 (2.1-2.6)
Los Angeles Co., Calif.	3	4.2 (4.1-4.3)	1.41 (1.37-1.45)	1.10 (1.06-1.12)	.19 (.18-.19)	2.1 (1.9-2.3)
Southeastern Arizona	3	3.7 (3.6-3.9)	1.25 (1.18-1.33)	.71 (.67-.75)	.22 (.21-.23)	1.7 (1.6-1.8)
castaneum						
San Diego, Calif.	7	2.5 (2.1-2.7)	.93 (.90-.95)	.63 (.57-.69)	.27 (.21-.32)	1.7 (1.4-1.9)
nigriculum						
Pachuca, Hidalgo	4	2.4 (2.2-2.5)	1.36 (1.30-1.42)	.90 (.77-1.07)	.20 (.18-.22)	1.6 (1.4-1.7)
Zimapan, Hidalgo	13	2.4 (2.1-2.7)	1.10 (.97-1.20)	.71 (.60-.82)	.25 (.22-.28)	1.7 (1.4-1.8)
Sombrerete, Zacatecas	2	2.7	1.20 (1.16-1.23)	.68 (.63-.73)	.26 (.24-.27)	1.7 (1.4-1.9)
matthewsi						
Van Horn, Texas	10	1.9 (1.7-2.1)	1.08 (1.00-1.17)	.53 (.46-.61)	.27 (.23-.29)	1.3 (1.1-1.5)
brunneum						
Pachuca, Hidalgo	1	2.7	1.40	1.33	.15	1.2
Zimapan, Hidalgo	24	2.3 (2.1-2.7)	1.48 (1.40-1.56)	1.20 (1.10-1.40)	.16 (.14-.17)	1.2 (1.1-1.4)

exception the several forms seem to be allopatric (at least so far as the present very limited records indicate). This one exception is *brunneum*, the most distinctive member of the group, which occurs sympatrically with *nigriculum* in central Mexico. The latter species and all the other members of this group may be thought of as comprising a single superspecies which ranges throughout the arid regions of the southwestern United States and northern Mexico.

Females assigned tentatively to this group have four-toothed mandibles with the basal two teeth small and recessed along the inner margin.

10. Pseudisobrachium occidentale new species

Holotype. — ♂, Novato, Marin Co., Calif., 25 Aug. 1953 (H. L. Mathis) [CAS].

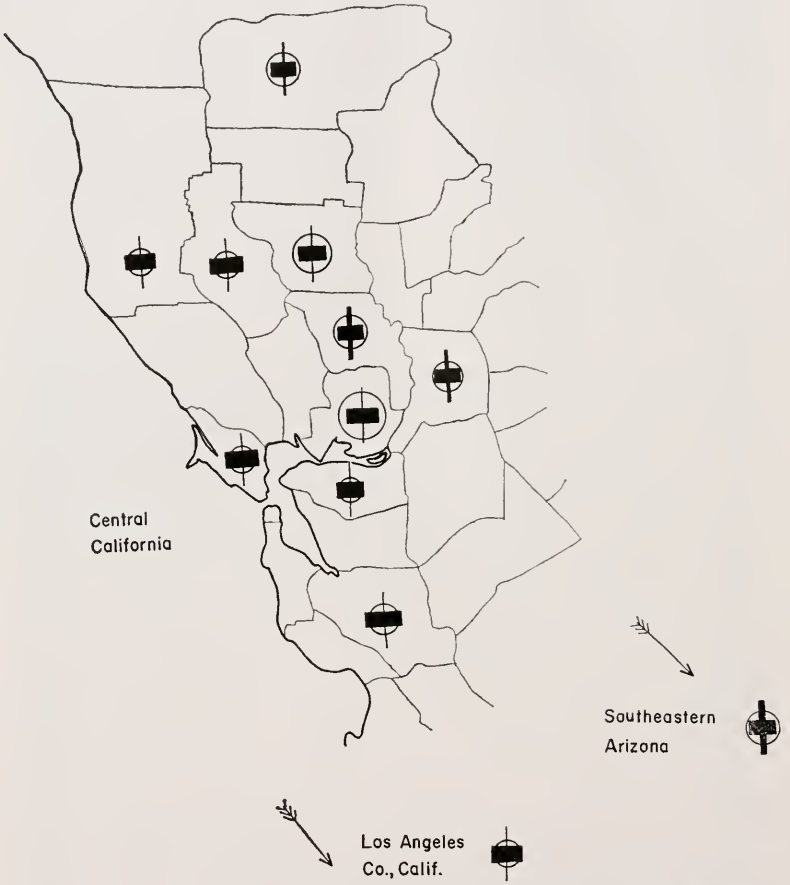
Description. — Length 5 mm.; LFW 4 mm. Head and thorax dark brownish-fuscous, almost black, abdomen bright chestnut brown, with weakly developed annulations of paler brown; coxae dark brown, femora and tibiae medium brown, tarsi light brown; antennal scape nearly black, flagellum medium brown; wings very weakly infuscated, veins and stigma brown. Mandibles with five teeth in an oblique series (Fig. 14). Clypeus tectiform medially, truncate apically. Antennae elongate, flagellum pubescent and with a few erect setae which on the basal segments are about half as long as width of flagellum, first four antennal segments in a ratio of about 11:3:5:5; segment eleven twice as long as thick. Front of moderate breadth, WF .65 X WH, 1.35 X HE; OOL subequal to WOT; ocelli in a small triangle, front angle less than a right angle, of moderate size, DAO .19 X WF. Vertex, in anterior view, rounded off well above eyes, distance from eye tops to vertex crest equal to about two-thirds the eye height. Front moderately shining, alutaceous, with small, shallow punctures. Pronotum and mesoscutum moderately shining, the latter with the punctures somewhat more sharply defined, although small; notauli very strong on anterior two-thirds of mesoscutum, absent behind; scutellum shining, disc nearly impunctate, basal and lateral foveae shallow. Propodeum very long, in dorsal view measuring 1.7 X as long as wide, in lateral view measuring 2.6 X as long as high; propodeal spiracles elongate, directed dorsad; disc with fine, reticulate ridges except nearly smooth caudad of end of median carina. Mesopleural callus strongly shining, nonalutaceous; remainder of mesopleura alutaceous, anteriorly

rather roughly punctate. Fore wing with discoidal vein rather strong, longer than transverse median vein, arising a short distance from the top of the latter vein (Fig. 55). Abdomen slender and elongate.

Paratypes. — CALIFORNIA: 6 ♂♂, Red Bluff, Tehama Co., 20 July 1956 (light trap, E. Yeomann) [UCD]; 1 ♂, Ukiah, Mendocino Co., 12 July 1935 (M. L. Jones) [CDAS]; 1 ♂ Hopland Grade, Mendocino Co., 5 May 1959 (S. M. Fidel) [UCD]; 100 ♂♂, Upper Lake, Lake Co., Aug. 1958 (light trap, R. E. Dolphin) [UCD, CAS, MCZ, CU, CM, INHS]; 1 ♂, Soda Bay, Lake Co., 25 July 1958 (light trap, R. E. Dolphin) [UCD]; 1 ♂, Arbuckle, Colusa Co., 14 July 1959 (light trap, J. Fowler) [UCD]; 3 ♂♂, College City, Colusa Co., June 1959 (light trap, J. Fowler) [UCD]; 25 ♂♂, 4.5-9 mi. W. Zamora, Yolo Co., June-July 1959 (light trap, J. Fowler) [UCD]; 20 ♂♂, 4 mi. SW. Dunnigan, Yolo Co., July 1959 (light trap, J. Fowler) [UCD]; 8 ♂♂, Winters & vic., Yolo Co., June-Aug. 1959 (light trap, J. Fowler); 3 ♂♂, 3 mi. NW. Yolo, June, July 1959 (light trap, J. Fowler) [UCD]; 4 ♂♂, Davis, July-Sept. [UCD]; 3 ♂♂, Woodland, 17 Aug. 1959 (light trap, J. Fowler) [UCD]; 1 ♂, Esparto, Yolo Co., 29 June 1959 (light trap, J. Fowler) [UCD]; 34 ♂♂, Fairoaks, Sacramento Co., 12 Aug. 1933 (A. Bellue) [USNM, CDAS, CU]; 1 ♂, Sacramento, 14 July 1933 (H. H. Keifer) [CDAS]; 1 ♂, Rio Linda, 6 July 1958 (light trap, J. Fowler) [UCD]; 1 ♂, Rio Vista, Solano Co., 19 July 1959 (light trap, E. Mezger) [UCD]; 1 ♂, Dixon, 13 July 1956 (light trap, E. Mezger) [UCD]; 19 ♂♂, Novato, Marin Co., Aug.-Sept. (light trap, H. L. Mathis) [CAS, UCD, MCZ]; 1 ♂, Mill Valley, Marin Co., 28 Sept. 1953 (H. L. Mathis) [UCD]; 1 ♂, San Venetia, Marin Co., 10 Oct. 1953 (H. L. Mathis) [UCD]; 1 ♂, Danville, Contra Costa Co., 18 Aug. 1949 (F. X. Williams) [CAS]; 2 ♂♂, Los Gatos, Santa Clara Co., 1 Aug. 1933 (J. A. Kusche) [CAS]; 1 ♂, Alma, Santa Clara Co., 30 Aug. 1933 (H.H. Keifer) [CDAS]; 3 ♂♂, Glendale, Los Angeles Co., Sept.-Oct. 1951 (W. M. Schlinger) [UCD]. ARIZONA: 1 ♂, Cave Creek Canyon, Chiricahua mts., 25 Aug. 1927 5-6000 feet (J. A. Kusche) [CAS]; 1 ♂, Cochise Stronghold, Cochise Co., 2 Oct. 1954 (at light, Butler and Werner) [UA]; 1 ♂, Madera Canyon, Santa Rita mts., 2-4 Aug. 1959 (K. V. Krombein) [KVK].

Variation in males. — The 247 paratypes range in size from 2.9 to 6.0 mm., fore wing from 2.4 to 5.0 mm. There is considerable variation in width of the front, with specimens from one

locality often being fairly consistent in this character, but the over-all variation not strongly correlated with geography. Ocellar size and antennal width appear to vary clinically from west



Map 1. — Some aspects of geographie variation in males of *P. occidentale*. Horizontal bars represent the mean L/W for the eleventh antennal segment; see Table II for actual values and for range of variation. Mean ocellar size is superimposed upon this as a circle by taking the DAO/WF ratio, multiplying it by ten, and using the same scale as for antennal length. Vertical bars indicate whether the front is weakly (thin line), moderately (thick line), or strongly alutaceous (thick bar). It will be seen that in coastal localities the ocelli are small as compared to the antennal length and the front is weakly alutaceous; as one proceeds eastward, regardless of the latitude, there is a tendency for larger ocelli, shorter antennae, and a more alutaceous front.

to east, with specimens from coastal California having generally longer antennae and smaller ocelli than specimens farther inland (Table II and Map 1). Although most specimens have the front, thoracic dorsum, and mesopleural callus rather shining, as in the type, in many specimens from Yolo and Sacramento counties, California, these parts are less shining and more strongly alutaceous. The three specimens from southeastern Arizona are distinctly more heavily alutaceous than any others, and in these the mesopleural callus is weakly differentiated. Again, there may be a west-to-east cline in this character. Although the range of this species covers a considerable distance north-to-south, there are no discernible clines in this direction, specimens from Sacramento County, California, being more like those from southern Arizona than they are like those from Marin County, California, a relatively short distance west. This species is being collected in great numbers in light traps, and may provide an interesting study in intraspecific variation, particularly when it is possible to fill in some of the wide gaps in its known range.

Female (assigned here tentatively). — Stanford Univ., Calif., 22 Dec. 1909 [USNM].

Description of female. — Length of body 3.1 mm., of head .6 mm., of thorax 1.1 mm. Head castaneous, thorax light castaneous, abdomen yellowish-brown; mandibles light castaneous, teeth rufous; clypeus and scape light castaneous, flagellum dull yellowish-brown; legs wholly yellowish-brown. Mandibles slender, with four distinct teeth but third and fourth teeth drawn well back along inner margin, as figured for *obscurum* (Fig. 36). Clypeus broadly truncate (actually very slightly concave) apically; median carina strong, not quite reaching margin. Head 1.35 X as long as wide; sides parallel, arcuately contracted near posterior margin to a broad, straight vertex; occipital carina obsolete dorsally. Eyes small, amber-colored and therefore not contrasting strongly to the brownish head. Anterior part of front and sides of head striato-punctate and also obscurely alutaceous; posterior half of front smooth and shining between the punctures, which are elongate except more circular toward vertex; under surface of head alutaceous, punctures rather evenly spaced. Pronotal disc 1.4 X as long as its posterior width, about as long as maximum width of thorax; mesonotum 1.5 X as long as wide, .82 X as long as maximum width of thorax; propodeum 1.6 X as long as wide. Pronotal disc weakly alutaceous behind and on sides, otherwise smooth and shining; punctures widely spaced, absent only from midline. Mesonotum

obscurely alutaceous on sides, polished medially, with some weak punctures on sides. Propodeum polished dorsally, obscurely punctate, spiracles subcircular, directed dorso-laterally. Mesopleurum strongly alutaceous, punctures rather weak. Body, including legs, with abundant short, pale setae.

Other females. — CALIFORNIA: 1, same data as preceding [USNM]; 1, Crow Canyon, Alameda Co., 19 Feb. 1939 (K. S. Hagen) [CIS].

Variation in females. — The two specimens from Stanford University are very similar in size, color, and structure. The specimen from Alameda County is considerably larger, the head being .94 mm. long, the thorax 1.65 mm. long (the abdomen is missing). The thorax is rich castaneous like the head. The head is only 1.25 X as long as wide; antero-dorsally it is distinctly striate-punctate but hardly alutaceous, and ventrally it is barely alutaceous but with stronger punctures than in the Stanford University specimens. In thoracic structure the three specimens are nearly identical.

Remarks. — The only male *Pseudisobrachium* known to occur in the San Francisco Bay area is *occidentale*, which is not uncommon and rather variable in size. Therefore, it is most logical that these females belong with *occidentale*. While there is nothing about their structure which contraindicates this assignment, there is still much to be learned about the distribution of western *Pseudisobrachium*, so this association must be considered tentative.

11. Pseudisobrachium castaneum new species

Holotype. — ♂, San Diego, Calif. (Ricksecker) [USNM, No. 65153].

Description. — Length 3 mm; LFW 2.7 mm. Thorax and abdomen chestnut-brown, head also of this color but top and front somewhat suffused with fuscous; legs, including coxae, uniformly light brown; antennae brown, somewhat darker than legs but lighter than body; wings hyaline, veins and stigma pale brown. Mandibles with five teeth. Anterior margin of clypeus very weakly concave. Antennae elongate, with pubescence and erect setae as in preceding species; first four segments in a ratio of about 15:6:9:8; segment eleven 1.6 X as long as thick. Front very narrow, WF only .55 X WH, .95 X HE; ocelli moderately large, OOL only .6 X WOT, DAO .22 X WF; front angle of ocellar triangle slightly less than a right angle.

Vertex rounded off a short distance above eye tops, distance from eye tops to vertex crest about .4 X HE. Front shining, alutaceous, punctures shallow, rather numerous. Pro- and mesonota also shining and with numerous but rather shallow and inconspicuous punctures; notauli weakly impressed on anterior half of mesoscutum; scutellum with basal groove narrow, lateral foveae well defined. Propodeum measuring 1.65 X as long as wide, in lateral aspect 2.5 X as long as high; spiracles small, elliptical, directed laterad; most of dorsum of propodeum smooth and shining, median carina sharply defined. Mesopleural callus strongly shining, barely alutaceous; remainder of mesopleura shining, very weakly punctate and without other strong sculpturing. Fore wing with the discoidal vein longer than the transverse median vein, but only very weakly pigmented, arising a short distance down on transverse median vein (Fig. 56).

Paratypes. — 6 ♂ ♂, all same data as type [USNM, MCZ].

Variation. — Body length varies from 2.6 to 3.0 mm., wing length from 2.1 to 2.7 mm. Coloration is quite uniform throughout the series. Means and range of variation for several characters are presented in Table II.

12. Pseudisobrachium matthewsi new species

Holotype. — ♂, Van Horn, Culberson Co., Texas, 22 July 1956 (at light, E. G. Matthews) [MCZ, No. 30272].

Description. — Length 2.2 mm.; LFW 1.8 mm. Head dark brownish-fuscous; thorax and abdomen dark chestnut brown except sides of basal abdominal segments paler; legs light brown except coxae somewhat darker; antennae brown, darker than legs but lighter than body; wings hyaline, veins and stigma light brown. Mandibles with five teeth, basal three teeth small, subequal in size and shape. Anterior margin of clypeus truncate. Antennae of moderate length, with conspicuous pubescence and a few very short erect setae; first four segments in a ratio of about 26:9:11:10; segment eleven 1.2 X as long as thick. WF .58 X WH, 1.1 X HE; ocelli rather large, in a broad triangle, front angle slightly greater than a right angle; OOL .5 X WOT; DAO .27 X WF. Distance from tops of eyes to vertex crest about .6 X HE; top of vertex only weakly rounded, almost straight across. Front alutaceous, shining, with shallow punctures. Pronotum and mesoscutum also shining but strongly alutaceous, the scutellum however nearly smooth; punctures of thoracic dorsum

shallow and inconspicuous; notauli strongly impressed on anterior third of mesoscutum. Propodeum 1.6 X as long as broad, in lateral aspect 3 X as long as high; spiracles small, subcircular, directed laterad; surface of propodeum mostly smooth and shining, median carina long and sharply defined. Mesopleural callus shining, barely alutaceous; remainder of mesopleura alutaceous but without strong sculpturing or punctures. Fore wing discoidal vein very weakly pigmented, about as long as transverse median vein and arising a short distance from top of that vein.

Paratypes. — 9 ♂ ♂, all same data as type [CU, MCZ, USNM].

Variation. — The paratypes range in size from 2.0 to 2.4 mm. and show no noteworthy differences in color from the type. Mean and range of variation for certain characters are presented in Table II. There appears to be some variation in the shape of the ocellar triangle, but without exception the front angle is at least as great as a right angle.

Female (assigned here tentatively). — El Paso Co., Texas, 22 July 1937 (W. F. Turner and W. H. Anderson, from soil in peach orchard) [USNM].

Description of female. — Length of body 1.8 mm., of head .43 mm., of thorax .8 mm. Head and thorax medium brown, abdomen light yellowish-brown; antennae and legs straw-colored. Mandibles with four well-defined teeth, about as figured for *obscurum* (Fig. 36). Clypeus slightly emarginate apically. Head rather slender, 1.42 X as long as wide; sides subparallel, converging behind to a straight vertex. Eye a single facet which is only slightly paler than the head. Front strongly polished, with small punctures which are separated, on the average, by about twice their own diameters, surface between punctures without any sculpturing whatever; under side of head also strongly polished and with small, rather evenly spaced punctures. Pronotal disc elongate, 1.6 X as long as its posterior width; mesonotum also elongate, about twice as long as wide, nearly as long as maximum width of thorax; propodeum subovoid, 1.65 X as long as wide. Pronotum strongly polished, with weak, widely spaced punctures, weakly alutaceous along posterior margin; mesonotum strongly polished in middle, otherwise weakly alutaceous; propodeum also strongly polished, weakly alutaceous posteriorly, mesonotum and propodeum both with only a few weak punctures on the sides. Sides of mesopleurum weakly alutaceous, weakly punctate. Body and legs with abundant short, pale setae.

13. Pseudisobrachium nigriculum new species

Holotype. — ♂, Zimapán, Hidalgo, Mexico, 11-14 June 1951 (at light, H. E. Evans) [MCZ, No. 30273].

Description. — Length 2.8 mm.; LFW 2.6 mm. Head dark brownish-fuscous, nearly black, thorax and abdomen dark brown, abdomen with lighter brown markings latero-posteriorly on basal segments; legs and antennae medium brown; wings hyaline, veins and stigma light brown. Mandibles with five teeth, the basal three teeth small, subequal. Anterior margin of clypeus truncate. Antennae of moderate length, rather coarsely pubescent and with numerous erect setae which toward the base are half as long as the thickness of the antennae; first four segments in a ratio of about 18:5:7:7, segment eleven 1.5 X as long as thick. WF .58 X WH, 1.1 X HE; ocelli rather large, OOL .6 WOT; DAO .28 X WF; front angle of ocellar triangle slightly less than a right angle. Vertex extended well above eye tops, where it is arched only weakly; distance from tops of eyes to vertex crest .67 X HE. Front weakly shining, strongly alutaceous, with moderately strong punctures which are separated from one another by from two to three X their own diameters. Pronotum and mesoscutum shining, moderately alutaceous, rather weakly punctate; notauli strong on the anterior fourth of the mesoscutum, absent behind; scutellum polished, basal groove and lateral foveae well defined but shallow. Propodeum 1.6 X as long as broad, in lateral view 3 X as long as high; spiracles small, elliptical, directed dorsolaterad; dorsal surface of propodeum shining, weakly alutaceous in front, smooth behind; median carina strong. Mesoplural callus strongly polished, smooth; remainder of mesopleura also shining, but weakly alutaceous and weakly punctate. Fore wing with discoidal vein slightly longer than the transverse median vein, arising near the top of this vein, moderately well pigmented.

Paratypes. — HIDALGO: 12 ♂♂, same data as type (H. E. Evans, P. D. Hurd) [MCZ, USNM, CU, CIS]; 4 ♂♂, Pachuca, 29 July 1954 (J. G. Chillcott) [CNC]. ZACATECAS: 2 ♂♂, 15 km. E. of Sombrerete, 28-31 July 1951 (H. E. Evans) [MCZ].

Variation. — The paratypes vary in size from 2.2 to 3.0 mm. Generally they agree well with the type in coloration, but several specimens, including both of those from Zacatecas, have the thorax and abdomen nearly black like the head, and the legs and antennae are also darker in these specimens. There are no marked structural differences between the Zacatecas specimens and those from Hidalgo (see Table II). Throughout both

series some variation can be noted in the strength of the punctures and microscopic sculpturing.

Remarks. — All specimens in the type series were taken at Coleman lanterns during the evening hours. The type locality was in desert at about 6000 feet, the Zacatecas location in arid grassland at about 7000 feet.

14. Pseudisobrachium brunneum new species

Holotype. — ♂, Zimapán, Hidalgo, Mexico, 11-14 June 1951 (at light, H. E. Evans) [MCZ, No. 30274].

Description. — Length 2.6 mm.; LFW 2.4 mm. Dark brown, except base and apex of abdomen suffused with lighter brown; antennae dark brown; legs medium brown, a little paler apically; wings hyaline, stigma brown, veins light brown. Mandibles with five teeth, the basal three teeth small, subequal (Fig. 15). Clypeus truncate apically, its median carina arched in profile. Antennae of moderate length, first four segments in a ratio of about 32:9:12:10, segment eleven 1.3 X as long as thick; flagellum with coarse, subappressed pubescence and a few erect setae which toward the base are about half as long as thickness of flagellum. WF .66 X WH, 1.5 X HE; ocelli small, OOL 1.2 X WOT, DAO .17 X WF; front angle of ocellar triangle less than a right angle. Vertex extended far above eye tops, where it is more or less squared off; distance from eye tops to vertex crest about equal to eye height. Front shining, moderately alutaceous, with shallow punctures. Pronotum and mesoscutum of much the same character, latter with notauli impressed on anterior third; scutellum strongly polished medially, basal groove and lateral foveae strong. Propodeum 1.8 X as long as broad, in lateral view 2.7 X as long as high; spiracles small, elliptical, directed dorsad; median carina strong on anterior two-thirds of disc, disc wholly alutaceous but more shining behind. Mesopleura shining, weakly alutaceous and weakly punctate, callus somewhat elevated but not differing otherwise from remainder of pleurum. Fore wing with discoidal vein weakly pigmented, about as long as transverse median vein and arising just below top of latter vein (about as in Fig. 56).

Paratypes. — HIDALGO: 23 ♂♂, same data as type (H. E. Evans, P. D. Hurd) [MCZ, USNM, CU, CIS, CAS, OEE, INHS]; 1 ♂, Pachuca, 29 July 1954 (J. G. Chillcott) [CNC].

Variation. — The paratypes vary in size from 2.2 to 2.9 mm. Color of the body and legs varies from rich chestnut-brown to dark brownish-fuscous with the head and thorax almost black.

In some specimens the punctures of the front are deep and well-defined (although not large), while in others they are scarcely evident. The distance from eye tops to the vertex crest varies from .75 to 1.0 X HE. Variation in other measurements is not great (Table II).

Remarks. — All specimens were collected at light along with specimens of *nigriculum*. Although the two species are very similar in size and color, there are several differences, *brunneum* having shorter antennae, less protruding eyes, and smaller ocelli.

Obscurum Species-group

The males of this group have a relatively compact body form as in the *crassum* group, but the mesopleural callus is weakly differentiated and alutaceous. Two large species with dark wings and punctate mesopleura may represent a link with the *crassum* group. The remaining five species are minute, desert-icolous species with pale wings and non-punctate pleura. In some males of this group the basal mandibular tooth is somewhat thicker than the adjacent teeth, approaching the condition in the *prolongatum* group. The females of only one species, *obscurum*, are known, and these can be assigned here only tentatively. These females differ in no outstanding features from those of the preceding species-group.

TABLE III

Species and locality	No.	LFW	WF/HE	OOL/WOT	DAO/WF	Ant. 11 L/W
obscurum						
Culberson Co., Texas	11	2.8 (2.3-3.1)	1.21 (1.16-1.28)	.60 (.54-.65)	.22 (.20-.24)	1.3 (1.2-1.5)
Chihuahua, Chih.	1	2.5	1.00	.55	.26	1.2
Cochise Co., Ariz.	2	2.6	1.11	.62	.22 (.21-.23)	1.3
Graham Co., Ariz.	1	2.6	1.18	.47	.25	1.4
Tucson, Ariz.	1	2.0	1.07	.50	.25	1.2
Superior, Ariz.	101	2.2 (1.6-2.9)	1.10 (.98-1.20)	.57 (.42-.65)	.23 (.21-.26)	1.2 (1.1-1.4)
Oracle, Ariz.	3	2.8 (2.3-3.0)	1.11 (1.07-1.14)	.54 (.50-.58)	.23 (.22-.24)	1.3 (1.2-1.4)
Santa Rosalia, Baja Cal.	1	2.3	1.08	.58	.22	1.4
Comondu, Baja Cal.	1	2.4	1.15	.61	.22	1.3
San Miguel, Baja Cal.	1	2.6	1.30	.65	.18	1.3
Venancio, Baja Cal.	6	2.5 (2.1-2.7)	1.22 (1.16-1.28)	.62 (.61-.65)	.20 (.18-.23)	1.2 (1.1-1.4)
La Paz, Baja Cal.	2	2.2 (2.0-2.4)	1.18 (1.15-1.21)	.65 (.58-.72)	.20 (.19-.21)	1.1
Santiago, Baja Cal.	4	2.2 (1.9-2.5)	1.10 (1.04-1.15)	.64 (.60-.69)	.21 (.20-.22)	1.2 (1.0-1.3)
Miraflores, Baja Cal.	1	2.3	1.08	.64	.22	1.3
otiosum						
Superior, Ariz.	3	2.0 (1.9-2.2)	1.48 (1.44-1.52)	.95 (90-1.00)	.15	1.3
michoacanum						
Tuxpan, Michoacan	1	3.0	1.60	1.70	.13	1.5
carolinianum						
Grahamville, S. C.	1	3.3	1.30	1.12	.15	1.4
Miami, Fla.	8	3.2 (2.9-3.4)	1.12 (1.05-1.23)	.76 (.70-.82)	.20 (.18-.23)	1.4 (1.3-1.4)
pallidum						
Yuma Co., Ariz.	2	1.8	1.08 (1.06-1.10)	.74	.20	1.0
gibbosum						
Hidalgo Co., N. Mex.	1	1.6	1.68	1.10	.15	1.1
testaceipes						
San Marcos, Nicaragua	1	1.8	1.43	1.40	.14	1.1

15. Pseudisobrachium michoacanum new species

Holotype. — ♂, Tuxpan, Michoacan, Mexico, 6000 feet elevation, 6 July 1959 (H. E. Evans) [MCZ, No. 30275].

Description. — Length 3.6 mm.; LFW 3.0 mm. Head and thorax black; abdomen shining black, except first tergite margined with brown; scape black, flagellum dark brown; apical half of mandibles rufous; legs dark brown, beyond the middle of the tibiae medium brown; wings lightly infuscated, covered with brown setulae, veins and stigma dark brown. Mandibles with five teeth, basal three teeth about equally developed (Fig. 18). Clypeus truncate apically. Antennae elongate, first four segments in a ratio of about 16:5:11:11, segment eleven 1.5 X as long as thick; pubescence light brown, erect setae numerous, some of them nearly half as long as thickness of flagellum. Front broad, WF .7 X WH, 1.6 X HE; ocelli small, far removed from eyes, forming an angle in front that is less than a right angle; DAO .13 X WF; OOL 1.7 X WOT. Vertex extended far above eye tops, distance from tops of eyes to vertex crest, subequal to eye height. Front alutaceous, moderately shining, with shallow punctures which are separated from one another by from 1 to 2 times their own diameters. Pro- and mesonota wholly alutaceous, including disc of scutellum, and with abundant small punctures which are fairly dense on sides of mesoscutum; notauli impressed on anterior .4 of mesoscutum. Propodeum 1.45 X as long as broad, in lateral view 2.1 X as long as high; spiracles elliptical, directed dorso-laterad; dorsal surface with rather strong reticulate sculpturing. Mesopleurum with callus wholly alutaceous, not strongly convex; anterior portion of mesopleurum with many large punctures. Discoidal vein of fore wing arising a short distance down on transverse median vein, pigmented to about length of basal vein.

Remarks. — The only known specimen of this species was taken on oak foliage at about 11 in the morning in open, bushy country. The small ocelli and dark coloration suggest that this is a diurnal species.

16. Pseudisobrachium carolinianum new species

Holotype. — ♂, Grahamville, South Carolina, 1 Aug. 1952 (J. Shuler) [Coll. H. K. Townes].

Description. — Length 4.5 mm.; LFW 3.3 mm. Head and thorax black, abdomen dark brown, basal tergite margined with paler brown; mandibles yellow-brown, teeth rufous; antennae

wholly ferruginous; legs bright castaneous except front coxae slightly infuscated; wings hyaline, veins and stigma brown. Mandibles with five teeth, basal tooth slightly thicker and more rounded than the third and fourth teeth. Clypeus truncate apically. Antennae of moderate length, first four segments in a ratio of about 23:5:11:10; segment eleven about 1.4 X as long as thick; pubescence and setae pale, the latter rather numerous and mostly about a third as long as the flagellar width. WF .65 X WH, 1.3 X HE; DAO .16 X WF; OOL 1.12 X WOT; ocelli forming an angle in front which is slightly less than a right angle. Vertex extended above eye tops a distance equal to about .8 X HE. Front alutaceous, weakly shining, with large, shallow punctures which are separated from one another by from 1 to 2 times their own diameters. Pro- and mesonota moderately shining, alutaceous, the punctures moderately strong; notauli strong on anterior half of mesoscutum. Propodeum measuring 1.3 times as long as broad; spiracles elongate-elliptical, directed laterad; disc with fairly strong sculpturing which shows some tendency to form transverse striae. Mesopleural callus alutaceous, not strongly convex; anterior portion of mesopleurum with many large punctures. Fore wing with discoidal vein about as long as basal vein, weakly pigmented.

Paratypes. — 8 ♂♂, Miami, Florida, 14 July 1950 (F. G. Butchers) [CNC, MCZ, USNM].

Variation. — The paratypes differ from the type in having consistently larger ocelli and a narrower front; the punctures of the body also tend to be somewhat weaker. It is conceivable that these represent a distinct species, but I think not.

17. Pseudisobrachium gibbosum new species

Holotype. — ♂, 8 mi. N. of Rodeo, Hidalgo Co., New Mexico, 4000 feet elevation, 8 Sept. 1959 (at light H. E. Evans) [MCZ, No. 30276].

Description. — Length 2.8 mm.; LFW 1.6 mm. Head, thorax, and abdomen dark brownish-fuscous; mandibles ferruginous; antennae dark brown; legs dark brown except tarsi and apical part of tibiae paler; wings very pale, stigma brown but veins nearly colorless. Mandibles with five teeth, the basal three teeth small, subequal. Clypeus broad basally, its sides tapering to a rather narrowly truncate apex. Antennae short, first four segments in a ratio of about 13:4:4:4; flagellar segments, except the last, only very slightly longer than thick, pubescence of flagellum pale and rather conspicuous although short, erect setae

short and few in number. Front broad, WF .74 X WH, 1.68 X HE; ocelli small, DAO .15 X WF, OOL 1.1 X WOT; front angle of ocellar triangle approximately a right angle. Vertex extended above eye tops a distance about equal to eye height. Front strongly shining, very weakly alutaceous, with a few strong punctures on upper half. Pro- and mesonota also strongly shining, the mesoscutum with a few small but deep punctures; notauli weakly impressed on anterior half of mesoscutum. Propodeum short, measuring 1.3 X as long as broad; spiracles small, subcircular, opening laterad; median carina present, disc with fine reticulate sculpturing over entire dorsal surface, stronger anteriorly. Mesopleurum shining and very weakly alutaceous except on the extreme anterior part, which is heavily sculptured; central portion of mesopleurum convex, not only the callus but the areas beneath and behind it, with a single large pit in the center. Discoidal vein of fore wing absent.

18. Pseudisobrachium otiosum new species

Holotype. — ♂, Superior, Pinal Co., Arizona, 7-17 July 1948 (H. K. Gloyd)[4] [USNM, No. 65159].

Description. — Length 2.8 mm.; LFW 1.9 mm. Head nearly black; thorax and abdomen dark brown; apical half of mandibles yellowish, teeth rufous; antennae light yellowish-brown, including scape; front coxae brown, legs otherwise straw-yellow; wings hyaline, clothed with pale setulae, stigma light brown, veins nearly colorless. Mandibles with five teeth, the basal three teeth small, subequal. Clypeus truncate apically. Antennae rather short, first four segments in a ratio of about 14:4:6:6; flagellar segments each slightly longer than thick, segment eleven 1.3 X as long as thick; pubescence of flagellum pale, erect setae pale, numerous, less than half as long as width of flagellum. WF .7 X WH, 1.52 X HE; ocelli small, DAO .15 X WF, OOL equal to WOT; ocelli forming an angle in front which is slightly less than a right angle. Vertex extended above eye tops a distance equal to about .8 X HE. Front strongly alutaceous, weakly shining, with shallow, inconspicuous punctures. Pro- and mesonota alutaceous, weakly punctate, moderately shining, notauli impressed only on the anterior .2 of mesoscutum. Propodeum

[4] This is the data given on the label of the type, except that the collector's name is given as D. K. G. Lloyd. Almost certainly this specimen was taken at a light trap by H. K. Gloyd at the Boyce Thompson Southwestern Arboretum, 4 mi. W. of Superior, as I have seen much other material taken by him there on those dates [INHS].

rather short, measuring 1.3 X as long as broad, in lateral view 2.2 X as long as high; spiracles small, elliptical, directed dorsad; median carina well developed, disc shining, with weak reticulate sculpturing. Mesopleurum wholly alutaceous, without strong punctures and with the callus poorly differentiated. Discoidal vein of fore wing absent.

Paratype.—ARIZONA: 1 ♂, same data as type [MCZ]; 1 ♂, Boyce Thompson Southwestern Arboretum, 4 mi. W. Superior, 28 Sept. 1949 (light trap, B. W. Benson) [INHS].

Variation. — One paratype is slightly larger, measuring 3 mm. in length, the fore wing 2.2 mm. In one paratype the third and fourth mandibular teeth are much smaller than the basal tooth, while in the second paratype the fourth tooth is so minute that the mandibles appear four-toothed except upon very close inspection.

19. Pseudisobrachium testaceipes Kieffer

Pseudisobrachium testaceipes Kieffer, 1906, Berlin Ent. Zeitschr., 50:240. [Type: ♂, San Marcos, Nicaragua (Coll. Baker) (Pomona College, Claremont, Calif.)]. — Kieffer, 1914, Das Tierreich, 41:480.

Description of holotype. — Length 2.5 mm.; LFW 1.8 mm. Head piceous, thorax dark castaneous, abdomen dark castaneous except light yellowish-brown on sides of basal segments; apical two-thirds of mandibles yellowish-brown, teeth rufous; scape light brown, flagellum dull castaneous; legs pale castaneous; tarsi straw-colored; wings hyaline, stigma light brown, veins amber; setulae of wing membrane brownish. Mandibles with five teeth, basal three teeth small, subequal. Clypeus narrowly truncate apically (actually very weakly arcuately concave). Antennae short, first four segments in a ratio of about 17:5:7:6, each flagellar segment very slightly longer than thick, segment eleven 1.1 X as long as thick; flagellar pubescence coarse, semi-erect, erect setae numerous and prominent. WF .68 X WH, 1.43 X HE; ocelli small, DAO .14 X WF; ocelli in a compact triangle, OOL 1.4 X WOT; vertex extended above eye tops a distance equal to about .7 X HE. Front alutaceous, moderately shining, punctures shallow, inconspicuous. Pro- and mesonota (including scutellar disc) strongly alutaceous, almost beaded, however rather shining, punctures shallow and inconspicuous; notauli weakly impressed on anterior .4 of mesoscutum. Propodeum about 1.4 X as long as broad; disc with some short carinae arising from base in addition to usual median carina, posterior part of disc

alutaceous, somewhat shining; spiracles elliptical, directed dorsad. Mesopleural callus strongly convex, shining although moderately alutaceous, remainder of mesopleurum alutaceous, obscurely punctate. Fore wing with discoidal vein present as a pigmented streak about as long as the basal vein.

Remarks. — I have seen no specimens of this species other than the type. It is a reasonably distinctive species, but has doubtless escaped attention from collectors because of its small size.

20. Pseudisobrachium pallidum new species

Holotype. — ♂, Wellton, Yuma Co., Arizona, 9 Aug. 1917 (Cornell Univ. Biol. Exp., J. C. Bradley) [CU].

Description. — Length 2.5 mm., LFW 1.8 mm. Entire body light brown; mandibles light yellowish-brown; antennae light yellowish-brown, flagellum with a tinge of rufous; legs straw-colored; wings very pale, setulae pale, stigma tinged with brown, veins colorless. Mandibles with basal three teeth small, basal tooth with its inner margin arching into the inner mandibular margin (Fig. 17). Clypeus broad basally, tapering to a rather narrowly truncate apex. Antennae short, first four segments in a ratio of about 3:1:1:1, segment three about 1.2 X as long as broad, segment eleven about as long as broad; flagellar pubescence pale, subappressed, erect setae virtually absent. Front very narrow, WF .59 X WH, 1.06 X HE; ocelli of moderate size, DAO .20 X HE; OOL .74 X WOT. Eyes somewhat bulging, vertex elevated above eyes a distance equal to about half HE. Front shining though regularly alutaceous, punctures weak and scarcely noticeable. Pro- and mesonota alutaceous although somewhat shining, without noticeable punctures; notauli absent. Propodeum very short, about 1.35 X as long as wide; disc shining, with weak sculpturing basally; spiracles small, subcircular, directed laterad. Mesopleurum rather convex, shining but wholly alutaceous, callus not well differentiated; punctures inconspicuous. Discoidal vein of fore wing absent.

Paratype. — 1 ♂, same data as type [CU].

Variation. — The single paratype is very similar to the type in every respect, including size.

21. Pseudisobrachium obscurum new species

Holotype. — ♂, Pine Springs, Culberson Co., Texas, 13-16 July 1955 (at light, E. G. Matthews) [MCZ, No. 30278].

Description. — Length 4.6 mm.; LFW 3.1 mm. Head and thorax black, abdomen dark brown, with indistinct banding with paler brown toward base; apical half of mandibles yellowish, teeth rufous; scape brown, flagellum bright reddish-brown; front coxae nearly black, middle and hind coxae and femora medium brown, remainder of legs light brown; wings hyaline, covered with pale setulae, stigma light brown, veins nearly colorless. Basal three teeth of mandibles subequal (Fig. 16). Clypeus truncate apically. Antennae rather short, first four segments in a ratio of about 18:5:10:9, segment eleven 1.5 X as long as thick; antennal pubescence extremely fine, pale, and closely appressed, erect setae short and few in number. WF .66 X WH, 1.20 X HE; ocelli slightly enlarged, DAO .21 X WF; front angle of ocellar triangle slightly greater than a right angle, OOL only .6 X WOT. Vertex broadly rounded, almost squared off, distance from eye tops to vertex crest equal to somewhat more than half HE. Front alutaceous, weakly shining, punctures numerous but small and inconspicuous. Pronotum and mesoscutum alutaceous, moderately shining, with numerous small punctures; notauli weakly impressed on anterior fourth of mesoscutum; scutellar disc shining. Propodeum about 1.3 X as long as broad; spiracles small, elliptical, directed dorsad; disc alutaceous but without other sculpturing except for median carina. Mesopleurum alutaceous, weakly punctate in front, callus not strongly differentiated. Discoidal vein of fore wing distinct, although very weakly pigmented like the rest of the veins.

Paratypes. — TEXAS: 10 ♂♂, same data as type [MCZ, CU, USNM]. CHIHUAHUA: 1 ♂, Chihuahua, 12 Aug. 1951 (at light, H. E. Evans) [MCZ]. ARIZONA: 2 ♂♂, 1 mi. S. Portal, Cochise Co., 12 Aug., 5 Sept. 1959 (at light, H. E. Evans) [CU, MCZ]; 1 ♂, Post Canyon, Pinaleno Mts., Graham Co., 5-6000 feet, 16 July 1917 (W. M. Wheeler) [MCZ]; 1 ♂, Tucson, 15 July 1937 (Bryant) [CAS]; 3 ♂♂, Oracle, Pinal Co., 25 July 1917 (W. M. Wheeler) [MCZ]; 101 ♂♂, Boyce Thompson Southwestern Arboretum, 4 mi. W. Superior, Pinal Co., May-Oct. (at light, H. K. Gloyd and B. W. Benson) [INHS, USNM, MCZ, CU]. BAJA CALIFORNIA: 1 ♂, 25 mi. S. Santa Rosalia, 25 July 1938 (Michelbacher & Ross) [CAS]; 1 ♂, Comondu, 22 July 1938 (Michelbacher & Ross) [CAS]: 1 ♂, 5 mi. S. San Miguel, 20 July 1938 (Michelbacher & Ross) [CAS]; 6 ♂♂, Venancio, 17 July 1938 (Michelbacher & Ross) [CAS, MCZ]; 2 ♂♂, La Paz, 7 Oct. 1941 (Ross & Bohart) [CAS]; 4 ♂♂, Santiago, 8 July 1938 (Michelbacher & Ross) [CAS]; 1 ♂,

5 mi. S. Miraflores, 10 July 1938 (Michelbacher & Ross) [CAS].

Variation in males. — The 135 paratypes range in size from 2.1 to 4.4 mm., fore wing from 1.6 to 3.1 mm. In some of the smaller Arizona specimens the head and thorax are much more shining and less alutaceous than in the type and most other specimens. In some Arizona specimens the basal mandibular tooth is thicker than the third and fourth teeth, more as in Figure 17. Some of the Arizona specimens have the abdomen light brown, occasionally the whole body light brown; these may, of course, be somewhat teneral. In the specimen from Chihuahua the antennae are darker than usual, while in one of the two specimens from Cochise County, Arizona, the antennae are very dark brown and the legs darker than usual. Head measurements do not exhibit an undue amount of variation (Table III).

Female (assigned here tentatively). — Sacaton, Pinal Co., Arizona, 1935, from soil in cotton field (L. D. Christenson) [USNM].

Description of female. — Length of body 1.8 mm., of head .5 mm., of thorax .9 mm. Head castaneous; thorax pale castaneous; abdomen, legs, antennae, clypeus, mandibles, and sides of head anterior to eyes, light yellowish-brown. Mandibles rather slender, basal two teeth small and situated back along inner margin of mandible (Fig. 36). Clypeus truncate apically, median ridge strong, not prolonged beyond margin. Head 1.35 X as long as wide; sides nearly parallel, weakly convergent behind to a broad, straight vertex; occipital carina obsolete dorsally. Eye a fairly large, whitish facet which contrasts well with the brownish head. Front punctate except along a narrow median band, punctures generally a bit longer than wide, separated from one another mostly by about their own diameters; surface of front weakly alutaceous between punctures, though rather strongly shining; under surface of head weakly alutaceous, with small, rather evenly spaced punctures. Pronotal disc 1.6 X as long as its posterior width, about as long as maximum width of thorax; mesonotum 1.4 X as long as wide, .68 X as long as maximum width of thorax; propodeum 1.5 X as long as wide. Pro- and mesonota weakly alutaceous, moderately shining, with small, widely spaced punctures which are largely absent medially; propodeum weakly alutaceous, obscurely punctate on sides; spiracles subcircular, opening dorso-laterad. Mesopleurum weakly alutaceous, punctures numerous but not very strong. Body with abundant pale setae; coxae, femora, and tibiae each with a few fairly long pale setae.

Other females. — ARIZONA: 4, same data as preceding [USNM, MCZ]; 1, Huachuca mts., 14 Sept. 1938 (R. H. Crandall) [UA].

Variation in females. — Variation in size, color, and standard measurements in this series is slight. One specimen from Sacaton is smaller than the other three, the head measuring only .42 mm., thorax .75 mm. In this specimen the head and thoracic dorsum are only very obscurely alutaceous and therefore more strongly shining than in the other three. The specimen from the Huachuca mts. is slightly larger than any of the others, the body measuring 2.6 mm., head .63 mm., thorax 1.1 mm.; in all other respects it agrees very well with description presented above.

Remarks. — The males of this species bear a close resemblance to those of *flavinervis* Fouts, another nocturnal, deserticolous species which occurs over much the same range. This resemblance extends to the shape of the ocellar triangle and nature of the antennal pubescence as well as to features which usually characterize desert species (pale wings, large ocelli, etc.). Pre-

Map 2. — Distribution of *P. obscurum*, males indicated by solid circles, supposed females by hollow circles. Distribution of *P. arenarium*, males indicated by solid squares, supposed females by hollow squares.

sumably these resemblances must be the result of convergence, since on the basis of mandibular structure the two forms belong to different species-groups. In general, the front is less distinctly punctate in *obscurum* than in *flavinervis*. The distribution of this species is shown on Map 2.

Prolongatum Species-group

Within this complex of three species the usually reliable character of the mandibular dentition breaks down. The basal mandibular tooth of the male is broad, its inner margin arching into the inner margin of the mandible. The third and fourth teeth are small, in some specimens of two of the species very small, even connate, and in a number of specimens of *prolongatum* (about 10 per cent of those examined) these two teeth are

TABLE IV

Species and locality	No.	LFW	WF/HE	OOL/WOT	OAO/WF	Ant. 11 L/W
aztecum						
Cuernavaca, Mor.	1	4.1	1.23	.60	.27	1.6
arenarium						
Pine Barrens, N. J.	5	4.3 (3.8-5.1)	.96 (.93-1.01)	.61 (.54-.70)	.25 (.23-.26)	1.9 (1.7-2.0)
Kill Devil Hills, N. C.	3	3.4 (3.1-3.6)	.98 (.96-.99)	.65 (.61-67)	.24 (.23-.25)	1.6 (1.5-1.8)
Tryon, N. C.	1	3.9	1.00	.65	.22	1.8
Clarke Co., Ga.	1	3.6	1.07	.68	.22	2.0
"Georgia"	2	3.4 (3.2-3.6)	.96 (.95-.97)	.62 (.60-.64)	.23	1.6 (1.5-1.7)
Orlando, Fla.	1	4.1	1.24	.89	.18	1.6
Camp Rucker, Ala.	2	4.3 (4.2-4.4)	.96 (.95-.97)	.69 (.63-.70)	.23 (.22-.24)	1.7 (1.6-1.8)
Camp Shelby, Miss.	2	4.2 (4.1-4.3)	.99 (.98-1.00)	.69 (.68-.70)	.23 (.22-.24)	1.9
Urbana, Ill.	15	4.3 (3.8-4.8)	.98 (.95-1.02)	.64 (.55-.71)	.25 (.24-.26)	1.8 (1.6-1.9)
prolongatum						
Norway Bay, Que.	4	3.4 (3.2-3.7)	1.65 (1.63-1.69)	1.42 (1.36-1.48)	.14	1.6 (1.5-1.7)
Ottawa, Ont. and vic.	2	3.6 (3.5-3.7)	1.63 (1.60-1.66)	1.29 (1.26-1.31)	.14	1.6 (1.5-1.7)
St. John, N. B.	2	3.1	1.69 (1.65-1.73)	1.41 (1.40-1.42)	.14	1.6
Bridgetown, Nova Scotia	49	3.3 (2.6-3.7)	1.58 (1.53-1.64)	1.30 (1.26-1.33)	.14 (.13-.15)	1.6 (1.5-1.8)
Bar Harbor, Me.	1	3.4	1.72	1.32	.14	1.7
Stratton, Me.	1	3.0	1.68	1.52	.14	1.8
Houghton, Me.	1	3.6	1.70	1.38	.14	1.8
Westerly, R. I.	1	3.1	1.55	1.25	.15	1.6
Lake George, N. Y.	1	3.8	1.75	1.52	.13	1.7
Oneonta, N. Y.	1	3.7	1.62	1.33	.13	1.6
Princeton, N. J.	1	3.6	1.51	1.32	.14	1.7
Mt. Holly Spr., Pa.	1	3.5	1.52	1.32	.13	1.5
Plummer's Isl., Md.	96	3.3 (2.5-3.7)	1.60 (1.50-1.75)	1.35 (1.24-1.43)	.14 (.12-.15)	1.7 (1.5-1.8)
Takoma Park, Md.	7	3.1 (2.5-3.7)	1.66 (1.62-1.70)	1.30 (1.24-1.39)	.13 (.12-.14)	1.6 (1.5-1.7)
Washington, D. C.	1	3.7	1.54	1.18	.14	1.6
Bolivar, W. Va.	1	2.6	1.63	1.35	.13	1.8
Hamrick, N. C.	2	3.0 (2.9-3.1)	1.68 (1.61-1.75)	1.41 (1.34-1.48)	.14	1.6 (1.5-1.7)
Crabtree Mds., N. C.	14	3.5 (2.9-3.9)	1.66 (1.62-1.72)	1.45 (1.35-1.58)	.14 (.13-.15)	1.6 (1.5-1.7)
Mt. Pisgah, N. C.	12	3.6 (3.0-4.1)	1.67 (1.63-1.70)	1.50 (1.37-1.64)	.14 (.13-.15)	1.7 (1.5-1.8)
Mt. Mitchell, N. C.	4	3.6 (3.2-3.9)	1.65 (1.60-1.70)	1.47 (1.32-1.60)	.14	1.6
Sioux City, Iowa	1	3.0	1.56	1.46	.12	1.6
Chilliwack, B. C.	1	3.5	1.58	1.22	.13	1.9
Tenino, Wash.	1	3.6	1.62	1.28	.13	1.5
Union Gap, Wash.	1	2.7-	1.60	1.15	.14	-
Spokane Falls, Wash.	1	3.5	1.56	1.25	.14	1.5

actually fused. Thus this group is distinctly intermediate between the three species-groups having five-toothed mandibles and the two having four-toothed mandibles.

22. Pseudisobrachium aztecum new species

Holotype. — ♂, Cuernavaca, Morelos, Mexico, 5500 feet elevation, 6 June 1959 (at light, H. E. Evans) [MCZ, No. 30279].

Description. — Length 5.3 mm.; LFW 4.1 mm. Head and thorax black, abdomen dark brown, basal segments suffused with paler; apical half of mandibles ferruginous; antennae brown; legs bright yellowish-brown except front coxae infuscated; wings subhyaline, veins brown, stigma dark brown. Mandibles with five teeth, the fifth tooth broad, continuous with the inner margin (Fig. 19). Clypeus truncate apically. Antennae fairly long, first four segments in a ratio of about 14:4:7:7, segment eleven 1.6 X as long as thick; pubescence of flagellum pale and appressed, erect setae short, sparse, and inconspicuous. WF .62 X WH, 1.23 X HE; ocelli large, anterior ocellus nearly .2 mm. in diameter, DAO .27 X WF; OOL .6 X WOT. Vertex extended above eye tops a distance equal to only slightly over half eye height. Front alutaceous, moderately shining, with abundant small punctures. Pro- and mesonota strongly shining, non-alutaceous, with abundant small punctures which are much more sparse medially; notauli strong on anterior .6 of mesoscutum. Propodeal disc dull and with fine sculpturing in front, more smooth and shining behind; spiracles elongate, directed dorsad; propodeum 1.5 X as long as broad. Mesopleurum shining, non-alutaceous, the anterior portion punctate. Discoidal vein of fore wing arising a short distance down on the transverse median vein, pigmented to about length of basal vein.

23. Pseudisobrachium arenarium new species

Holotype. — ♂, Lebanon State Forest, Burlington Co., New Jersey, 19 Aug. 1958 (at light, H. E. Evans and D. F. Beneway) [MCZ, No. 30280].

Description. — Length 5.5 mm.; LFW 4.3 mm. Head and thorax black, abdomen brown, basal segments suffused with light brown; apical half of mandibles light brown, teeth rufous; antennae medium brown; legs bright castaneous, except front coxae blackish; wings faintly tinged with brown, veins and stigma brown. Mandibles with five teeth, third and fourth teeth small, fifth tooth very broad and blunt (Fig. 20). Clypeus truncate apically. Antennae fairly long, first four segments in a ratio of about 14:3:8:7, segment eleven 1.9 X as long as thick; pubescence of flagellum pale, rather rough and suberect, erect setae numerous, most of them about half as long as thickness of flagellum. Front very narrow, WF .52 X WH, .93 X HE;

ocelli rather large, anterior ocellus measuring about .15 mm. in diameter, DAO .26 X WF; OOL .54 X WOT. Vertex extended above eye tops a distance equal to about half HE. Front alutaceous, weakly shining, with large, shallow punctures which are separated from one another by from one to two times their own diameters. Pro- and mesonota alutaceous, punctate, weakly shining; notauli sharply impressed on anterior half of mesoscutum; scutellar disc shining. Propodeum 1.5 X as long as broad, its disc weakly sculptured except at the end of the median carina, where there is a smooth and shining area; spiracles elongate-elliptical, directed dorsad. Mesopleurum alutaceous and with strong though shallow punctures, except that the callus is well-defined and somewhat shining. Discoidal vein of fore wing arising a short distance down on transverse median, pigmented to slightly more than length of basal vein (as figured for *prolongatum*, Fig. 57).

Paratypes. — NEW JERSEY: 2 ♂♂, same data as type [MCZ]; 2 ♂♂, Wrangle Brook Road, Lakehurst, N. J., 26 Aug., 7 Sept. 1955-56 (D. M. Anderson, J. G. Franclemont) [CU]. NORTH CAROLINA: 3 ♂♂, Kill Devil Hills, Dare Co., 27-29 July 1955 (at light, K. V. Krombein) [KVK]; 1 ♂, Tryon, 25 July (at light, W. F. Fiske) [USNM]. GEORGIA: 1 ♂, Clarke Co., 25 Sept. 1959 (Richards) [CU]; 2 ♂♂, no further data [ANSP]. ALABAMA: 2 ♂♂, Camp Rucker, 12 Dec. 1942 (J. G. Franclemont) [USNM]. MISSISSIPPI: 2 ♂♂, Camp Shelby, nr. Hattiesburg, 30 July, 2 Sept. 1943 (C. D. Michener) [AMNH]. ILLINOIS: 15 ♂♂, Urbana, Aug.-Oct. (at light, C. A. Hart, G. T. Reigel) [INHS, MCZ, CU].

Other specimens not designated paratypes: 3 ♂♂, without data [INHS]; 1 ♂ tentatively assigned here from FLORIDA: Orlando, July 1927 (O. C. McBride, in light trap) [USNM].

Variation in males. — The 30 paratypes vary in size from 4.2 to 6.8 mm., fore wing from 3.1 to 5.1 mm. (Table IV). The abdomen is lighter than the head and thorax in all specimens and in some is light reddish-brown. The mesopleural callus varies from moderately to very strongly shining. Some of the variation shown in Table IV appears to be clinal, specimens from the North having, for example, generally larger ocelli than those from the South. The specimen from Florida which I assign here, tentatively, has unusually small ocelli and unusually wide front. Among the other specimens, the smallest ocelli and widest front occurs in some of those from Georgia and North Carolina. It seems probable that the Florida specimen, different as it seems, merely represents the extreme of one or more clines.

Female (assigned here tentatively). — St. Charles, Mo., 1949, "in vial with *Stig* [*matomma*] *pallipes*" (M. Talbot) [USNM].

Description. — Length of body 4 mm., of head .92 mm., of thorax 1.7 mm. Entire body castaneous, head slightly darker than thorax, abdomen slightly paler than thorax; mandibles, clypeus, and scape light castaneous, flagellum dull yellowish-brown; legs bright yellowish-brown. Mandibles with three teeth, as figured for *prolongatum* (Fig. 39), clypeus broadly subtruncate, its median carina sharp but not reaching apical margin. Head 1.15 X as long as wide, sides nearly parallel, posteriorly arcuately convergent to a broad, nearly straight vertex. Eyes each consisting of a single pale, fairly conspicuous facet. Front with a median impunctate streak, otherwise with close, elongate punctures, somewhat alutaceous, on lower sides somewhat striato-punctate; under surface of head strongly alutaceous and rather weakly punctate. Pronotal disc 1.3 X as long as its posterior width; mesonotum 1.4 X as long as wide; propodeum about 1.4 X as long as wide. Pronotal disc weakly alutaceous and with fairly strong punctures except medially, where it is smooth and shining. Mesonotum and propodeum both wholly but rather weakly alutaceous, both with a number of fairly strong punctures on the sides; punctate lateral parts of propodeum actually as large in area as median impunctate strip. Mesopleurum alutaceous, weakly punctate. Hairs of body and legs numerous, pale, of moderate length.

Other females. — PENNSYLVANIA: 1, Philadelphia, 20 May 1939 (W. L. Brown, from nest of *Proceratium* sp.) [USNM]. NORTH CAROLINA: 1, Durham, June 1945, Duke forest (A. S. Pearse) [INHS].

Variation in females. — The females from Pennsylvania and North Carolina are slightly smaller than the one from Missouri (head length .88 and .82 mm., thorax length 1.6 and 1.5 mm., respectively). The resemblance to the Missouri specimen is very close in every respect, including measurements.

Remarks. — The females assigned here tentatively have much in common with *prolongatum*, and it is possible that they fall within the range of variation of that species. However, on the basis of the available material they do appear to show constant differences from *prolongatum* and to inhabit a generally more southerly range, suggesting that they may be the females of *arenarium* (Map 2). It is interesting to note that two of the three records for this species indicate an association with ponerine ants, while several records for *prolongatum* suggest a relationship with formicine and myrmicine ants.

24. Pseudisobrachium prolongatum (Provancher)

Bethylus prolongatus Provancher, 1881, Nat. Canad., 12: 265. [Type: ♂ (not female as stated), Cap Rouge, Que. (Quebec Prov. Museum, yellow label no. 944)].

Perisemus prolongus Ashmead, 1893, Bull. U. S. Nat. Mus., 45: 72.

Isobrachium magnum Ashmead, 1893, Bull. U. S. Nat. Mus., 45: 36. [Type: ♂, Spokane Falls, Wash. (USNM no. 10068)]. New synonymy.

Isobrachium myrmecophilum Ashmead, 1893, Bull. U. S. Nat. Mus., 45: 37. [Type: ♀, Beatty, Pa. (USNM no. 10069) (♂ allotype misassociated)]. New synonymy.

Isobrachium mandibulare Ashmead, 1893, Bull. U. S. Nat. Mus., 45: 38. [Type: ♀, Retreat, Haywood Co., N. C. (USNM no. 14046) (♂ allotype misassociated)]. New synonymy.

Isobrachium montanum Ashmead, 1893, Bull. U. S. Nat. Mus., 45: 39. [Type: ♀, Helena, Mont., April 30, from nest of *Formica rufibarbis* (H. G. Hubbard) (USNM no. 14047) (♂ allotype misassociated)]. New synonymy.

Pseudisobrachium montanum Kieffer, 1908, Genera Insect., 76: 24. — Kieffer, 1914, Das Tierreich, 41: 479. — Fouts, 1928, Proc. Ent. Soc. Wash., 30: 122.

Pseudisobrachium magnum Kieffer, 1908, Genera Insect., 76: 24. — Kieffer, 1914, Das Tierreich, 41: 479. — Fouts, 1928, Proc. Ent. Soc. Wash., 30: 122.

Pseudisobrachium myrmecophilum Kieffer, 1908, Genera Insect., 76: 24. —Kieffer, 1914, Das Tierreich, 41:479. —Fouts, 1928, Proc. Ent. Soc. Wash., 30:122.

Pseudisobrachium mandibulare Kieffer, 1908, Genera Insect., 76: 24. —Kieffer, 1914, Das Tierreich, 41: 480. —Fouts, 1928, Proc. Ent. Soc. Wash., 30: 122.

Pseudisobrachium rugosulum Fouts, 1928, Proc. Ent. Soc. Wash., 30: 124. [Type: ♂, Mount Holly Springs, Pa., Aug. 12, 1920 (swept from wheat stubble, R. Fouts) (USNM no. 62551)]. New synonymy.

Pseudisobrachium agilis Whittaker, 1928, Trans. Ent. Soc. London, 76: 386. [Type: ♂, Chilliwack, Br. Col., Aug.-Oct., 1926-27 (O. Whittaker) (British Museum)]. New synonymy.

Pseudisobrachium prolongatus Krombein, 1958, U. S. Dept. Agri. Monogr. 2, first suppl., p. 97.

Plesiotype. — ♂, "R.C." [Rideau Canal, Ottawa, Ont.], Aug. 22, 1894 (Harrington) [CNC].

Description. — Length 4.3 mm.; LFW 3.7 mm. Head and thorax piceous, abdomen shining brown, on sides of basal segments light yellowish-brown; apical half of mandibles yellowish-brown, teeth rufous; antennae castaneous; front coxae brown, legs otherwise bright yellowish-brown; fore wing very faintly tinged with brown, veins and stigma dark brown. Mandibles

with five teeth, third and fourth teeth small and close together, fifth tooth broad, its margin continuous with that of inner mandibular margin (Fig. 21). Antennae with first four segments in a ratio of about 23:6:11:11, segment three 1.7 X as long as thick, segment nine 1.5 X as long as thick; flagellar pubescence pale, rather coarse, erect setae numerous, many of them nearly half as long as diameter of flagellum. WF .71 X WH, 1.6 X HE; ocelli small, DAO .14 X WF; OOL 1.26 X WOT; ocelli in a compact triangle, front angle less than a right angle. Vertex broadly rounded a distance above eyes tops subequal to eye height. Front and vertex strongly alutaceous, weakly shining, with weak punctures which for the most part are separated by from 1 to 1.5 X their own diameters. Pronotum alutaceous, with many weak punctures. Mesoscutum alutaceous, punctures rather strong and numerous, on the sides separated by no more than their own diameters; notauli fairly strong on anterior .6 of mesoscutum; scutellar disc strongly shining. Propodeum 1.5 X as long as wide; median carina long; disc with weak, irregular sculpturing, spiracles elliptical, directed laterad. Mesopleurum with callus convex, shining, weakly alutaceous; remainder of mesopleurum alutaceous, anteriorly with strong, close punctures. Discoidal vein of fore wing arising a short distance down on transverse median vein, pigmented to a distance exceeding length of basal vein (Fig. 57).

Males examined. — QUEBEC: 4, Norway Bay, 26-31 Aug. 1938 (Shewell, Hobbs) [CNC]; 1, Aylmer, 18 Sept. [CNC]. ONTARIO: 1, Rideau Canal, Ottawa, 22 Aug. (Harrington) [CNC]. NEW BRUNSWICK: 2, St. John, 9-18 Sept. (A. G. Leavitt) [USNM]. NOVA SCOTIA: 49 ♂♂, Bridgetown, 2 Sept.-1 Oct. (G. E. Sanders) [CNC]. MAINE: 1, Bar Harbor, 1 Oct. 1941 (A. E. Brower) [USNM]; 1, Stratton, Franklin Co., 19 Aug. 1945 (J. C. Bradley) [CU]; 1, Houghton, 18 Aug. 1945 (J. C. Bradley) [CU]. RHODE ISLAND: 1, Westerly, 8 Sept. 1937 (M. Chapman) [HKT]. NEW YORK: 1, Oneonta, 2 Sept. 1935 (H. K. Townes) [HKT]; 1, Lake George, 30 Aug. 1893 (J. L. Zabriskie) [MCZ]. NEW JERSEY: 1, Princeton, 28 Sept. 1945 (K. W. Cooper) [USNM]. MARYLAND: 96, Plummer's Isl., 29 Aug.-26 Sept. 1958-60, one on *Solidago* (K. V. Krombein, H. E. Evans) [MCZ, USNM, KVK]; 7, Takoma Park, July-Oct. (H. & M. Townes) [HKT]. DISTRICT OF COLUMBIA: 1, Washington, 8 Sept. 1952 (R. Boettcher) [USNM]. WEST VIRGINIA: 1, Bolivar, 19 Sept. 1942 (H. K. Townes) [HKT]. NORTH CAROLINA: 12, Mt. Pisgah, 5000-5749 feet, 2-5 Sept. (H. & M. Townes) [HKT]; 14, Crabtree

Mds., Yancey Co., 21 Aug. 1950 (H. & M. Townes) [HKT]; 4, Mt. Mitchell, 4000-6500 feet, 17-26 Aug. 1950 (H. & M. Townes) [HKT]; 2, Hamrick, 17 Aug. 1950 (H. & M. Townes) [HKT]. IOWA: 1, Sioux City (C. N. Ainslie) [USNM]. WASHINGTON: 1, Tenino, 25 Sept. 1897 (A. P. Morse) [USNM]; 1, Spokane Falls [USNM]; 1, Union Gap, 27 July 1942 (L. J. Lipovsky) [KU]. BRITISH COLUMBIA: 1, Chilliwack, Aug.-Oct. 1926-7 (O. Whittaker) [Coll. R. M. Fouts].

Variation in males. — The 207 males examined exhibit a size range from 3.0 to 5.5 mm., fore wing 2.5 to 4.1 mm. The legs are bright yellowish-brown in the Ottawa plesiotype described above, in the single male from Iowa, and in most specimens from the Atlantic coastal plain from Maine to District of Columbia; otherwise they tend to be suffused with brown, most particularly in specimens from the Pacific Northwest and the Southern Appalachians. As shown in Table IV, the ocellar triangle tends to be less far removed from the eyes in specimens from the Pacific Northwest, most far removed in specimens from the southern Appalachians (but exceptions are not uncommon). In occasional specimens from the Northeast and from the Appalachians, the mesopleural callus is less prominent and only weakly shining. The most striking variation is in the mandibles. In most specimens the third and fourth teeth are separate, although small (as in Fig. 20). In a few specimens (including some from eastern Canada, New York, and Maryland) they are connate (Fig. 21). In eight of the specimens examined, these teeth are completely fused so that the mandibles are in fact four-toothed as they are in members of the species-groups which follow (Fig. 22). These eight specimens are from New York (Oneonta), Pennsylvania (Mt. Holly Springs, type of *rugosulum* Fouts), and North Carolina (Hamrick and Mt. Pisgah). Dr. I. H. H. Yarrow of the British Museum (Natural History) has examined the type of *agilis* Whittaker, from British Columbia, and writes that in this specimen the mandibles are four-toothed. In a topotypic paratype in the collection of R. M. Fouts, they appear to be weakly five-toothed, although the mandibles are worn and it is difficult to be certain of this.

Plesiallotype. — ♀, Toronto, Ontario, 24 April 1894 [CNC].

Description of female. — Length 4 mm., LH .85 mm., LT 1.7 mm. Head and thorax castaneous, abdomen light castaneous; mandibles, clypeus, and antennae light castaneous; legs bright yellowish-brown. Mandibles with three teeth, basal tooth rather

small (Fig. 39). Clypeus broadly subtruncate, median carina strong but not quite reaching margin. Head 1.2 X as long as wide, sides weakly arcuate, head width greatest about midway, behind this sides more convergent to vertex, which is straight; occipital carina absent dorsally. Eyes indicated by small, pale brown spots. Front with an impunctate streak medially, otherwise with rather dense, elongate punctures, anteriorly rather strongly striato-punctate; surface between punctures moderately shining, somewhat alutaceous; under surface of head more strongly alutaceous, punctures rather evenly spaced. Pronotal disc 1.4 X as long as its posterior width; mesonotum 1.3 X as long as wide; propodeum 1.5 X as long as wide. Pronotal disc shining, weakly alutaceous behind, with abundant small punctures except medially; mesonotum bare and shining medially, laterally weakly alutaceous and with some small punctures; disc of propodeum strongly polished, with a few weak punctures on the extreme sides; spiracles circular, directed dorso-laterally. Mesopleurum strongly alutaceous on sides, weakly punctate. Body and legs with numerous pale setae.

Females examined. — ONTARIO: 1, Toronto, 24 April 1894 [CNC]; 1, Eastern part [CNC]. NEW HAMPSHIRE: 1, Pike, on *Picea* (E. J. Kraus) [USNM]. MASSACHUSETTS: 2, Lexington, 5 June 1955 (in nests of *Acanthomyops*, W. L. Brown) [MCZ]; 3, Forest Hills, May (Mann, Williams) [USNM]; 1, Lynn Woods Res., 12 Oct. 1949, (rotten log, K. Christiansen) [USNM]. CONNECTICUT: 1, West Rock Ridge, New Haven, in moss, 24 June 1950 (P. Bellinger) [USNM]. NEW YORK: 1, Tuxedo, 30 May 1925 (in clump of grass, Wm. T. Davis) [MCZ]; 1, Ithaca, 1 Oct. 1957 (soil sample, E. F. Menhinick) [CU]. PENNSYLVANIA: 2, Beatty [USNM, MCZ]. DELAWARE: 1, Christiana, 31 May 1953 (tree hole, R. S. Howard) [MCZ]. DISTRICT OF COLUMBIA: 6, Washington, May, July, Aug., one in nest with *Camponotus pennsylvanicus* [USNM]. VIRGINIA: 1, Falls Church, 18 May (N. Banks) [MCZ]; 1, Vienna, 25 Sept. 1927 (leaf litter, J. C. Bridwell) [USNM]; 2, Occoquan, 23 April 1925 (W. M. Mann) [USNM]. NORTH CAROLINA: 1, Duke Forest, Durham, 14 April 1945 (in litter, A. S. Pearse) [INHS]; 1, 4 mi. N. Cherokee, 2000 ft., 29 May 1957 (Berlese sample, W. R. M. Mason) [CNC]; 1, Haywood Co. [USNM]. KENTUCKY: 1, Bowen, 8 May 1947 [INHS]. ILLINOIS: 1, Oakwood, 29 Sept. 1933 (in old hickory log, H. H. Ross) [INHS]; 1, Little Grassy Lake, Williamson Co., 10 Aug. 1958 (in litter, W. L. Brown)

[MCZ]. IOWA: 2, Iowa City [USNM]. NORTH DAKOTA: 1, Walsh Co., 23 June 1950 (with *Formica* sp., W. E. LaBerge) [USNM]. MONTANA: 1, Helena, 30 April (from nest of *Formica rufibarbis*, H. G. Hubbard) [USNM]; 1, Assiniboine, April (with *Formica rufibarbis*) [USNM].

Variation in females. — Of the 35 females before me, the smallest is 3.4 mm. long, head .68 mm., thorax 1.3 mm.; the largest is 5.2 mm. long, head 1.0 mm., thorax 1.9 mm. The color of the head and thorax varies from dark castaneous to pale castaneous, in the latter case scarcely any darker than the abdomen. The specimen described above is about average in both size and color. In some specimens the head is somewhat more parallel-sided, head length about 1.3 X head width. The mandibles of most specimens resemble Figure 39, but in some the third tooth is relatively weak, and in a few the inner mandibular margin is sufficiently undulate so as to suggest a very weak fourth tooth (as in Fig. 37).

Remarks. — I have studied the types of Ashmead's species *myrmecophilum*, *mandibulare*, and *montanum* and can find no noteworthy differences between them. The evidence that these

Map 3. — Distribution of *P. prolongatum*, males indicated by solid circles, females by hollow circles. Distribution of *P. flavinervis*, males indicated by solid triangles, supposed female by a hollow triangle.

females go with *prolongatum* is purely circumstantial, based largely on a coincidence of ranges (Map 3) plus the rather large size of both males and females as compared with sympatric species. While I am reasonably sure that this association of sexes is correct, it is to be hoped that males and females will someday be taken in closer association than they have so far.

I have not studied the type of Provancher's *prolongatum*, but O. Peck, K. V. Krombein, and W. R. M. Mason have all seen the type and sent me their notes on it. Dr. Mason specifically checked several characters and compared the specimen with drawings which I sent him. The type has five-toothed mandibles and in every way compares closely with the plesiotype described above. The type is lacking the abdomen, hind legs, middle legs except coxae, right fore wing, and tips of antennae.

This is the most northerly in distribution of any species of the genus, the more southerly records (North Carolina) all being from moderate to high altitudes. It is partially sympatric with *ashmeadi* and to a more limited extent with several other species, but in the colder parts of its range it is the only representative of the genus. The relatively large size of the species plus the fact that it is reasonably common in the northeastern United States and eastern Canada probably accounts for its having been described so many times.

Carbonarium Species-group

To this group are assigned nine species, two of them relatively common eastern species, the remaining seven apparently uncommon species occurring in western United States, Mexico, and Central America. Not only are species differences in this group decidedly unspectacular, but the group as a whole is only weakly separable from specimens of the preceding group having four-toothed mandibles and from certain species of the *rufiventre* group, particularly *flaviventre*. This is the most difficult section of the genus, and I have sometimes been rather arbitrary in deciding what to consider a species, particularly with respect to the rather limited western material.

25. Pseudisobrachium carbonarium (Ashmead)

Epyris carbonarius Ashmead, 1893, Bull. U. S. Nat. Mus., 45: 59. [Type: ♂, Washington, D. C. (USNM no. 14063)].

Holepyris carbonarius Kieffer, 1906 [*In* André, Spec. Hymen. Eur., 9: 341]. — Kieffer, 1914, Das Tierreich, 41: 388.

Pseudisobrachium carbonarius Krombein, 1958, U. S. Dept. Agri. Monogr. 2, first suppl., p. 97.

Plesiotype. — ♂, Bowie, Maryland, 27 Aug. 1944 (H. & M. Townes) [HKT].[5]

Description. — Length 4 mm.; LFW 3.3 mm. Head and thorax piceous, abdomen shining reddish brown, paler basally and apically; mandibles yellowish-brown, teeth rufous; antennae wholly bright yellowish-brown with a tinge of rufous; legs bright yellowish-brown except middle and hind coxae slightly darker and fore coxae nearly piceous; wings subhyaline, stigma brown, veins amber. Mandibles with four teeth, the basal tooth broad, not separated from inner margin (as in Fig. 23). Clypeus with its truncate apical margin about equal to length of third antennal segment. Antennae with first four segments in a ratio of about 26:6:10:10, segment three and segment eleven each about 1.4 X as long as thick; flagellar pubescence pale, moderately coarse, erect setae numerous but mostly less than half as long as thickness of flagellum. Front very broad, WF .74 X WH, 1.8 X HE;

TABLE V

Species and locality	No.	LFW	WF/HE	OOL/WOT	DAO/WF	Ant. 11 L/W
carbonarium						
Maryland and D. C.	19	2.7 (2.4-3.3)	1.80 (1.67-1.94)	1.56 (1.45-1.70)	.11 (.10-.13)	1.3 (1.2-1.5)
Virginia	5	2.7 (2.4-3.0)	1.85 (1.78-1.91)	1.57 (1.50-1.71)	.11	1.3
West Virginia	2	2.6 (2.4-2.8)	1.80 (1.78-1.82)	1.58 (1.54-1.62)	.12	1.4
Table Rock, S. C.	14	2.7 (2.1-3.2)	1.80 (1.73-1.90)	1.62 (1.53-1.69)	.13 (.12-.14)	1.4
Greenville, S. C.	3	2.5 (2.3-2.7)	1.70 (1.65-1.75)	1.67 (1.64-1.70)	.12	1.3
Tigerville, S. C.	2	2.9 (2.8-3.0)	1.86 (1.80-1.92)	1.57 (1.54-1.60)	.12	1.3
Pinnacle Pk., Ga.	1	3.0	1.95	1.76	.10	1.4
Elgin, Ala.	1	2.5	1.78	1.50	.12	1.3
Illinois	7	2.5 (2.2-3.0)	1.79 (1.70-1.93)	1.57 (1.46-1.74)	.12 (.11-.13)	1.5 (1.4-1.6)
Onaga, Kansas	1	3.0	1.84	1.46	.13	1.5
minimum						
Grant Co., N. Mex.	1	2.3	1.47	1.20	.14	1.0
Cochise Co., Ariz.	1	3.0	1.70	1.35	.12	1.2
Yavapai Co., Ariz.	1	2.3	1.58	1.38	.13	1.2
minutissimum						
Las Cruces, N. Mex.	1	1.7	1.50	1.17	.15	1.0
Tucson, Ariz.	2	1.5 (1.3-1.7)	1.72 (1.68-1.76)	1.47	.12	1.0
Punta Lobos, Baja Cal.	1	1.6	1.65	1.44	.12	1.1
Cuernavaca, Morelos	1	1.9	1.57	1.26	.12	1.1
Yepocapa, Guatemala	1	2.0	1.53	1.52	.13	1.2
flavicornis						
La Ceiba, Honduras	2	2.4 (1.9-2.8)	1.49 (1.46-1.52)	1.24 (1.18-1.30)	.14	1.0
Granada, Nicaragua	1	2.7	1.50	1.22	.14	1.0
navajo						
Coconino Co., Ariz.	1	2.8	1.48	.94	.14	1.2
Yavapai Co., Ariz.	1	2.7	1.61	1.03	.14	1.2
hurdi						
Canutillo, Durango	6	2.9 (2.6-3.2)	1.82 (1.75-1.90)	1.15 (1.06-1.23)	.13 (.12-.14)	1.1 (1.0-1.3)
krombeini						
Albuquerque, N. Mex.	1	2.9	1.52	1.06	.15	1.3
White Sands, N. Mex.	1	2.7	1.48	1.00		1.3

[5] I have studied the type specimen of this species, but it is in rather poor condition; I have therefore elected to base my description on a specimen compared with the type.

ocelli small, in a compact triangle far removed from eyes, DAO .11 X WF, OOL 1.46 X WOT. Distance from tops of eyes to vertex crest slightly greater than HE. Front weakly shining, very strongly alutaceous, actually beaded in appearance, punctures very shallow and inconspicuous. Pro- and mesonota, including scutellar disc, also strongly alutaceous and obscurely punctate; notauli present on anterior .4 of mesoscutum. Propodeum about 1.35 X as long as broad, disc wholly covered with fine, reticulate ridges, median carina strong; sides of propodeum also with fine sculpturing; spiracles elliptical, directed dorsad. Mesopleurum wholly strongly alutaceous, callus scarcely elevated or differentiated; anterior part of mesopleurum with shallow punctures. Discoidal vein of fore wing arising a short distance down on the transverse median vein, strong basally, then weakened but extending as a pigmented line for a distance greater than length of basal vein (much as in *ashmeadi*, Fig. 58).

Specimens examined. — MARYLAND: 1 ♂, Bowie, 27 Aug. 1944 (H. & M. Townes) [HKT]; 5 ♂♂, Takoma Park, 7-11 Sept. 1942-43 (H. & M. Townes) [HKT]; 12 ♂♂, Plummer's Island, Sept.-Oct. (Krombein, Viereck, Evans) [USNM, KVK, MCZ]. DISTRICT OF COLUMBIA: 1 ♂, Washington [type, USNM]. VIRGINIA: 2 ♂♂, Rosslyn, Aug., Nov. [USNM]; 1 ♂, Falls Church, Aug. [USNM]; 1 ♂, Dunn Loring, Aug. [HKT]; 1 ♂, Vienna, June (J. C. Bridwell) [USNM]. WEST VIRGINIA: 1 ♂, Cheat Mts., June [CM]; 1 ♂, Philippi, Sept. (G. E. Wallace) [CM]. SOUTH CAROLINA: 14 ♂♂, Table Rock, 17 Aug. 1952 (G. & L. Townes) [HKT]; 3 ♂♂, Greenville, Aug., Oct. [HKT]; 2 ♂♂, Tigerville, 26 Aug. 1930 (Oman, Tuthill) [KU]. GEORGIA: 1 ♂, Pinnacle Pk., Rabun Co., 20 Aug. 1913 [CU]. ALABAMA: 1 ♂, Elgin, 6 July 1939 (R. H. Beamer) [KU]. ILLINOIS: 2 ♂♂, Marshall, 27 Sept. 1934 (Frison & Ross) [INHS]; 2 ♂♂, Anvil Rock, 3 Oct. 1934 (Frison & Ross) [INHS]; 1 ♂, Cave-in-Rock, 2 Oct. 1934 (Frison & Ross) [INHS]; 1 ♂, White Heath, 10 Sept. 1889 (C. A. Hart) [INHS]; 1 ♂, Urbana, 7 Aug. 1891 [INHS]. KANSAS: 1 ♂, Onaga (Crevecoeur) [KSU].

Variation in males. — The 55 males examined vary in size from 2.5 to 4.1 mm., fore wing from 2.1 to 3.3 mm. Variation in color and in standard measurements (Table V) is unusually small for a wide-ranging species.

Female (assigned here tentatively). — Pittsboro, N. C., 7 Oct. 1948, Berlese funnel, leaf mould (D. L. Wray) [USNM].

Description of female. — Length 3.1 mm., LH .60 mm., LT 1.1 mm. Head rufo-castaneous, thorax castaneous, abdomen light yellowish-brown; mandibles, clypeus, and antennae light castaneous, legs wholly light yellowish-brown. Mandibles as shown in Figure 37; clypeus broadly truncate apically and with median carina strong. Head 1.35 X as long as wide, sides subparallel but actually very weakly converging almost to posterior margin, where they are arcuately convergent to a broad, straight vertex. Eyes small, not contrasting to head, barely distinguishable. Front wholly alutaceous, though less strongly so above than antero-laterally; punctures rather elongate, separated from one another by about or less than their own maximum diameters; under side of head strongly alutaceous, weakly punctate. Pronotal disc 1.3 X as long as its posterior width, mesonotum 1.4 X as long as broad, propodeum 1.4 X as long as broad. Pronotum sparsely punctate, weakly alutaceous, though barely so in median area; mesonotum wholly weakly alutaceous, weakly punctate on sides; propodeal disc wholly alutaceous, though very weakly so antero-medially, sides weakly punctate. Mesopleurum laterally strongly alutaceous, weakly punctate. Body hairs pale, mostly rather short, abundant over most of body and legs.

Other females. — NORTH CAROLINA: 1, Fayetteville, 8 May 1949 (leaf mould, D. L. Wray) [USNM]. KENTUCKY: 1, Bowen, 8 May 1947 [INHS]. NORTH DAKOTA: 1, Minot, 21 May 1954 (wheat stubble, C. Benton) [USNM].

Variation in females. — The females from Kentucky and North Dakota are nearly identical in size to the specimen described above; the Fayetteville, N. C., specimen is slightly larger (head length .63 mm., thorax length 1.2 mm.). The latter specimen has the head only 1.3 X as long as wide, while in the Kentucky and North Dakota specimens it is fully 1.4 X as long as wide. The Kentucky specimen has the head rather distinctly striato-punctate antero-laterally and the eyes are more distinct than in the other specimens.

Remarks. — The females associated here tentatively are very similar to those of *rufiventre*. They are more heavily alutaceous than typical *rufiventre* females and also have a more elongate head; both these features also separate the males of these two species and suggest this association of the females.

TABLE VI

Species and locality	No.	LFW	WF/HE	OOL/WOT	DAO/WF	Ant. II L/W
ashmeadi						
Marmora, Ont.	1	2.7	1.42	1.00	.16	1.4
Massachusetts	4	2.2 (1.9-2.6)	1.63 (1.56-1.68)	1.32 (1.23-1.38)	.15 (.14-.16)	1.3 (1.2-1.4)
E. Hartford, Conn.	3	2.8 (2.6-3.0)	1.61 (1.48-1.63)	1.24 (1.16-1.30)	.13 (.12-.15)	1.3 (1.1-1.4)
Long Island, N. Y.	5	2.5 (2.2-2.9)	1.77 (1.71-1.94)	1.43 (1.33-1.72)	.12 (.10-.14)	1.2 (1.1-1.3)
Upstate New York	14	2.7 (2.3-3.3)	1.54 (1.40-1.64)	1.20 (1.00-1.40)	.14 (.13-.16)	1.3 (1.2-1.4)
Cassville, N. J.	1	2.6	1.76	1.41	.12	1.3
Takoma Park, Md.	20	2.5 (2.0-3.0)	1.60 (1.46-1.86)	1.24 (1.17-1.31)	.13 (.12-.14)	1.2 (1.0-1.3)
Washington, D.C. and vic.	27	2.5 (2.0-2.9)	1.67 (1.47-1.80)	1.25 (1.06-1.42)	.13 (.12-.15)	1.2 (1.0-1.4)
Hardy Co., W. Va.	1	2.2	1.61	1.37	.13	1.2
North Carolina	8	2.9 (2.1-3.5)	1.57 (1.47-1.68)	1.28 (1.10-1.50)	.14 (.12-.16)	1.3 (1.0-1.4)
South Carolina	22	2.5 (1.9-3.1)	1.58 (1.43-1.80)	1.30 (1.13-1.53)	.13 (.10-.14)	1.2 (1.0-1.4)
Georgia	8	2.5 (2.2-2.9)	1.60 (1.44-1.70)	1.30 (1.00-1.50)	.13 (.11-.15)	1.2 (1.1-1.3)
Ft. George, Fla.	1	2.6	1.55	1.50	.14	1.1
Waldo, Fla.	2	2.5 (2.2-2.8)	1.42 (1.36-1.48)	1.02 (1.00-1.04)	.15	1.0
Coleta, Ala.	4	2.5 (2.2-2.8)	1.45 (1.43-1.47)	1.23 (1.15-1.28)	.15	1.3 (1.1-1.4)
Fulton, Miss.	3	2.7 (2.3-3.0)	1.65 (1.58-1.77)	1.36 (1.22-1.64)	.12 (.11-.13)	1.2 (1.0-1.4)
Urania, La.	1	2.7	1.40	1.14	.15	1.3
Hamilton Co., Tenn.	2	2.2 (1.9-2.5)	1.49 (1.45-1.53)	1.12 (1.11-1.13)	.14	1.1 (1.0-1.2)
Gatlinburg, Tenn.	1	2.4	1.66	1.40	.13	1.1
Barberton, Ohio	2	2.8 (2.4-3.2)	1.61 (1.57-1.65)	1.18 (1.10-1.25)	.14	1.3
Michigan	2	2.6	1.56 (1.53-1.59)	1.22 (1.17-1.27)	.15	1.3
Illinois	9	2.5 (2.0-3.0)	1.55 (1.45-1.70)	1.15 (1.00-1.30)	.14 (.13-.16)	1.2 (1.0-1.4)
Joplin, Mo.	1	3.1	1.46	1.00	.16	1.3
Palmyra, Mo.	2	2.4 (2.3-2.5)	1.49 (1.44-1.53)	1.35 (1.30-1.40)	.14	1.3 (1.2-1.4)
Manhattan, Kansas	1	2.0	1.41	1.14	.14	1.1
persimile						
Lower Lake, Cal.	6	2.9 (2.6-3.1)	1.58 (1.42-1.76)	1.00 (.90-1.13)	.16 (.13-.17)	1.5 (1.4-1.6)
Upper Lake, Cal.	3	3.2 (3.1-3.3)	1.57 (1.54-1.60)	1.10 (1.07-1.12)	.15 (.14-.16)	1.6
Soda Bay, Lake Co., Cal.	1	2.8	1.60	1.13	.15	1.5
Colusa Co., Cal.	1	2.5	1.57	.86	.16	1.4
Davis, Cal.	1	2.7	1.55	.91	.18	1.6
Sacramento, Cal.	1	3.5	1.70	.88	.15	1.4

26. Pseudisobrachium ashmeadi new species

Isobrachium myrmecophilum Ashmead, 1893, Bull. U. S. Nat. Mus., 45: 37. [♂ allotype, Washington, D. C. (USNM); ♀ holotype = *P. prolongatum* Prov.].

Isobrachium mandibulare Ashmead, 1893, *ibid.*, p. 38. [♂ allotype, Ft. George, Fla. (USNM); ♀ holotype = *P. prolongatum* Prov.].

Holotype. — ♂, Washington, D. C., 6 Sept. 1952 (Richard Boettcher) [USNM no. 65154].

Description. — Length 4.2 mm.; LFW 2.8 mm. Head piceous; thorax dark reddish-brown; abdomen castaneous, somewhat paler basally and apically; mandibles yellowish, teeth rufous; scape yellowish-brown, flagellum similar but with a tinge of rufous; legs wholly yellowish-brown; veins and stigma brown. Mandibles with four teeth, third tooth small, basal tooth broad, confluent with inner margin of mandible (Fig. 23). Clypeus with its truncate apical margin about as long as third antennal segment; median clypeal carina straight in profile. Antennae with first four segments in a ratio of about 22:5:8:8, segment three and segment eleven each about 1.3 X as long as thick; flagellar pubescence pale, coarse, erect setae numerous, some of them half as long as width of flagellum. WF .69 X WH, 1.58 X HE; ocelli

small, forming a triangle the front angle of which is less than a right angle; OOL 1.32 X WOT. Distance from tops of eyes to vertex crest subequal to eye height (Fig. 1). Front weakly shining, alutaceous though scarcely beaded as in *carbonarium;* punctures shallow though clearly evident, separated from one another by about their own diameters. Pronotum moderately shining, alutaceous, punctate. Mesoscutum also moderately shining, punctures small; notauli distinct on anterior .4; scutellar disc strongly shining. Propodeum 1.4 X as long as wide, disc shining, with reticulate sculpturing in front which is nearly absent behind; median carina well developed; spiracles small, nearly circular, directed dorsad. Mesopleurum with callus moderately convex, shining but distinctly alutaceous; remainder of mesopleurum only weakly shining, with large, shallow punctures. Discoidal vein weakly pigmented for a distance about equal to basal vein (Fig. 58). Genitalia as shown in Figure 63.

Paratypes. — ONTARIO: 1 ♂, Marmora, 16 Aug. (J. McAlpine) [CNC]. MASSACHUSETTS: 2 ♂♂, Holliston, Aug. (N. Banks) [MCZ]; 1 ♂, Forest Hills, 12 Oct. 1910 [MCZ]; 1 ♂, S. Natick, 2 Sept. 1940 (J. C. Bradley) [CU]. CONNECTICUT: 3 ♂♂, East Hartford, 3-5 Sept. 1947 (sweeping, H. E. Evans) [CU, MCZ]. NEW YORK: 1 ♂, Poughkeepsie, 25 Aug. 1936 (H. K. Townes) [HKT]; 1 ♂, Rens'l'ville, (K. W. Cooper) [USNM]; 2 ♂♂, Hancock, 10 Aug. 1935 (H. K. Townes) [HKT]; 1 ♂, Freeville, Tompkins Co., 1 Sept. 1922 [CU]; 1 ♂, McLean Bogs, Tompkins Co., 30 Aug. 1953 (sweeping grass, H. E. Evans) [CU]; 5 ♂♂, Ithaca, Aug.-Sept. (at light, sweeping) [CU, MCZ]; 1 ♂, Minetto, 21 Aug. 1938 (W. T. M. Forbes) [CU]; 1 ♂, Buffalo, 14 Oct. (M. C. Van Duzee) [CAS]; 1 ♂, DeBruce, 23-26 Aug. 1912 [AMNH]; 1 ♂, Farmingdale, 29 Aug. 1938 (H. K. Townes) [HKT]; 1 ♂, Bethpage, Aug. 1938 (F. S. Blanton) [CU]; 2 ♂♂, Babylon, Aug., Oct. (F. S. Blanton) [CU, USNM]; 1 ♂, Selden, L. I., 1 Oct. 1934 (sweeping flowers, F. S. Blanton) [USNM]. NEW JERSEY: 1 ♂, Cassville, 18 Aug. 1910 [AMNH]. MARYLAND: 20 ♂♂, Takoma Park, July-Sept., 1942-43 (H. & M. Townes) [HKT, MCZ]; 13 ♂♂, Plummer's Island, 31 Aug.-5 Oct., one on *Solidago* (K. V. Krombein, H. E. Evans) [MCZ, USNM, KVK]. DISTRICT OF COLUMBIA: 2 ♂♂, Washington, 6-8 Sept. 1952 (R. Boettcher) [USNM]. VIRGINIA: 6 ♂♂, Vienna, Aug. 1932 (J. C. Bridwell) [USNM]; 1 ♂, Clifton, Aug. 1932 (J. C. Bridwell) [USNM]; 1 ♂, Dunn

Loring, 28 Aug. 1949 (K. V. Krombein) [HKT]; 3 ♂♂, Falls Church, Aug.-Oct. (N. Banks) [MCZ]; 1 ♂, [no specific locality] under stone, 22 Aug. 1895 [USNM]. WEST VIRGINIA: 1 ♂, Lost River State Park, Hardy Co., 29 July-11 Aug. 1957 (KVK) [KVK]. NORTH CAROLINA: 1 ♂, Pink Beds, 23 July 1952 (G. & L. Townes) [HKT]; 1 ♂, Mooresville, 12 Sept. 1949 (H., M. & G. Townes) [HKT]; 1 ♂, Smoky Mts., Bryson City, 2000 feet, 25 Aug. 1930 (F. Carpenter) [MCZ]; 1 ♂, Flat Rock, 6 Sept. 1952 (G. & L. Townes) [HKT]; 1 ♂, Kill Devil Hills, Dare Co., 3 Aug. 1956 (K. V. Krombein) [KVK]; 2 ♂♂, Walnut, 20 Aug. 1930 (P. W. Oman) [KU]; 1 ♂, Hamrick, 29 Aug. 1950 (H., M. & D. Townes) [HKT]. SOUTH CAROLINA: 12 ♂♂, Greenville, July-Sept. (L. & G. Townes) [HKT]; 6 ♂♂, Table Rock, 17 Aug. 1952 (G. & L. Townes) [HKT]; 1 ♂, Columbia, 11 Sept. 1951 (L. & G. Townes) [HKT]; 3 ♂♂, Cleveland, 2 Aug. 1952 (G. & L. Townes) [HKT]. GEORGIA: 1 ♂, Pinnacle Pk., Rabun Co., 20 Aug. 1913 [CU]; 1 ♂, Spring Creek, Decatur Co., 16-29 July 1912 [MCZ]; 2 ♂♂, Tifton [USNM]; 1 ♂, Prattsburg, 25 July 1930 (L. D. Tuthill) [KU]; 1 ♂, Perty, 12 Aug. 1939 (R. H. Beamer) [KU]; 2 ♂♂, Austell, 17 July 1910 [MCZ]. FLORIDA: 2 ♂♂, Waldo, 18 Aug. 1930 (R. H. Beamer) [KU]. ALABAMA: 4 ♂♂, Coleta (H. H. Smith) [USNM]. MISSISSIPPI: 3 ♂♂, Fulton, 14 July 1930 [KU]. LOUISIANA: 1 ♂, Urania, 14 July 1943 [INHS]. TENNESSEE: 2 ♂♂, Hamilton Co., 20 Sept. 1939 (Turner) [USNM]; 1 ♂, Gatlinburg, 31 Aug.-4 Sept. 1940 (B. D. Burks) [INHS]. OHIO: 2 ♂♂, Barberton, 23 Aug. 1936 (L. J. Lipovsky) [KU]. MICHIGAN: 1 ♂, Bay Co., 22 July 1939 (R. R. Dreisbach) [RRD]; 1 ♂, Midland Co., 10 July 1952 (RRD) [RRD]. ILLINOIS: 1 ♂, Fox L., 13 Aug. 1937 (Ross & Burks) [INHS]; 1 ♂, Evergreen Park, 23 Aug. 1934 (DeLong & Ross) [INHS]; 2 ♂♂, Oak Lawn, July, Aug. [INHS]; 1 ♂, Marshall, 27 Sept. 1934 (Frison & Ross) [INHS]; 1 ♂, Seymour, 5 Aug. 1939 (Ross & Riegel) [INHS]; 1 ♂, Mahomet, 3 Aug. 1937 (Ross & Burks) [INHS]; 1 ♂, Principia College, Jersey Co., 2 July 1943 (C. L. Remington) [USNM]; 1 ♂, Alto Pass, 13 Aug. 1891 (C. A. Hart) [INHS]. MISSOURI: 1 ♂, 5 mi. N. Joplin, 5 Aug. 1950 (at light, H. E. Evans) [MCZ]; 2 ♂♂, Palmyra, 16 Sept. 1939 (G. T. Riegel) [INHS]. KANSAS: 1 ♂, Manhattan, 27 Sept. 1930 (D. A. Wilbur) [KSU].

Variation in males. — The 148 males examined vary in size from 2.2 to 4.2 mm., with the vast majority between 3 and 4 mm.;

LFW varies from 1.9 to 3.5. In some specimens the head and thorax are paler than in the type, and in a few the thorax and abdomen are piceous like the head; in no case is the abdomen contrastingly colored as compared to the thorax. The legs are yellow-brown in most specimens, but occasional specimens from various parts of the range have the legs brownish (though never dark brown). There is considerable variation in head shape; while in most specimens the head is slightly higher than wide and the distance from the eye tops to the vertex crest subequal to the eye height, in numerous specimens from various parts of the range the head is as wide as or wider than high and the distance from the eye tops to the vertex crest notably less than the eye height. As suggested in Table VI, most of the variation in this species shows little apparent correlation with geography. However, there is a tendency for specimens from the southern parts of the range to have shorter antennae. As in other species, local populations are sometimes rather distinctive in certain morphological characters. For example, five specimens from Long Island, N. Y., and one from New Jersey, all have the front unusually broad and the eyes proportionally very small.

Female (assigned here tentatively). — MASSACHUSETTS: Arlington, 24 May 1953, *Formica fusca* nest in woods (W. L. Brown) [MCZ].

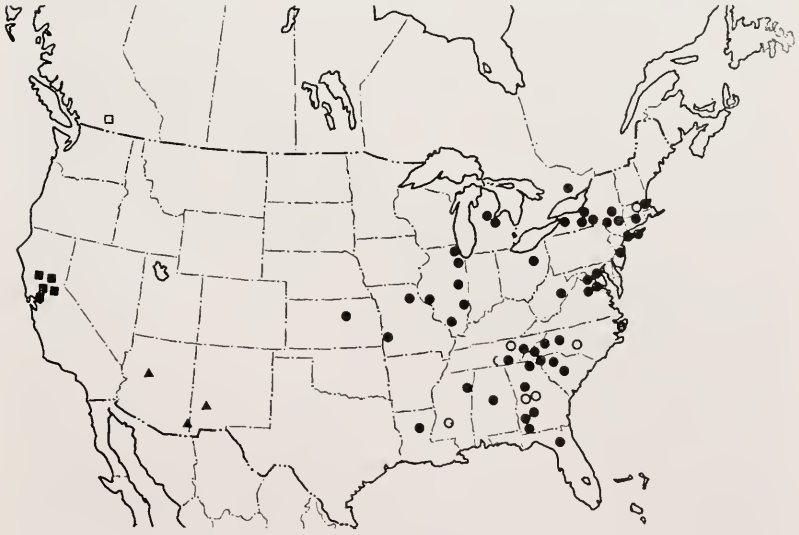
Description of female. — Length 2.9 mm., LH .50 mm., LT .95 mm. Head castaneous, thorax light castaneous, abdomen bright yellowish-brown; mandibles, clypeus, and antennae light castaneous; legs straw-colored. Mandibles with a weakly indicated fourth tooth (Fig. 38). Clypeus weakly emarginate apically, median carina strong. Head 1.33 X as long as wide, sides subparallel, posteriorly arcuately convergent to a vertex which is weakly emarginate medially. Eyes no larger than a head puncture, not contrasting in color to head and barely distinguishable. Front strongly shining, non-alutaceous, punctures very strong, separated by from 1-2 X their own diameters, except absent along median strip; under side of head shining, weakly alutaceous, weakly punctate. Pronotal disc 1.4 X as long as its posterior width; mesonotum about 1.5 X as long as wide; propodeum also about 1.5 X as long as wide. Pronotum strongly shining, non-alutaceous, with fairly strong, widely separated punctures except along median strip, which is bare. Mesonotum strongly shining and non-alutaceous except around edges. Propodeal disc very strongly shining, weakly alutaceous behind and with a few punctures on extreme sides. Mesopleurum weakly

alutaceous, weakly punctate. Hairs of body and legs numerous, pale, of moderate length.

Other females. — MASSACHUSETTS: 2, Forest Hills, one of them 4 May 1918 (W. M. Mann) [USNM]. NORTH CAROLINA: 1, Richmond Co., 28 Feb. 1938 (peach orchard, W. F. Turner) [USNM]. GEORGIA: 1, Upson Co., 7 March, 1938 (peach orchard, W. F. Turner) [USNM]; 3, Peach Co., May, Aug., Dec. (soil of peach orchard, W. F. Turner) [USNM]; 1, Fort Valley, 1936 (Christenson) [USNM]. TENNESSEE: 1, Hamilton Co., 16 Apr. 1940 (peach orchard, W. F. Turner) [USNM]; 1, Roane Co., 22 Nov. 1937 (in soil, W. F. Turner) [USNM]. MISSISSIPPI: 1, Lincoln Co., 14 July 1936 (W. F. Turner) [USNM].

Variation in females. — In the 12 females assigned here, head length varies from .47 to .53 mm. (mean .50); LH/WH varies from 1.26 to 1.33 (mean 1.30); thorax length varies from .90 to 1.0 mm. (mean about .95). Some of the Georgia specimens have the body hairs unusually dense and elongate. In the specimens from Forest Hills, Mass., the under side of the head is quite strongly alutaceous, but in most specimens it is only weakly so.

Remarks. — This is apparently one of the commoner species



Map 4. — Distribution of *P. ashmeadi,* males indicated by solid circles, supposed females by hollow circles. Distribution of *P. minimum,* males indicated by solid triangles (females unknown). Distribution of *P. persimile,* males indicated by solid squares, possible female by a hollow square.

of the genus. Males have often been misidentified as *myrmecophilum,* but the type of that species is a female which I feel confident goes with Provancher's *prolongatum.* The females which I believe go with *ashmeadi* show relatively little variation in size, color, and body features, although the males exhibit considerable variation. It may well be true that the males assigned here represent more than one species and that the females go with only one of those species. (See Map 4.)

27. Pseudisobrachium minimum new species

Holotype. — ♂, City of Rocks State Park, Grant Co., N. Mex., 17 July 1959 (K. V. Krombein) [USNM, no. 65160].

Description. — Length 3.0 mm.; LFW 2.3 mm. Head black; thorax dark brownish-fuscous; abdomen dark, shining brown, a little paler on sides of basal segments; apical two-thirds of mandibles light brown, teeth rufous; scape brownish-fuscous, flagellum bright castaneous; front coxae fuscous, remaining coxae and all femora medium brown, rest of legs light brown; wings hyaline, veins and stigma light brown. Mandibles with four teeth, basal tooth prominent, somewhat thicker than third tooth (Fig. 24). Clypeus with median carina arched, apex narrowly truncate. Antennae with first four segments in a ratio of about 30:9:10:10, segment three 1.2 X as long as thick, segment eleven about as long as thick; flagellar pubescence pale and moderately coarse, erect setae numerous but rather short. WF .71 X WH, 1.47 X HE; ocelli small, in a small triangle the front angle of which is less than a right angle; OOL 1.20 X WOT. Distance from tops of eyes to vertex crest subequal to eye height. Front shining, rather weakly alutaceous, punctures small but numerous and well-defined, separated from one another by about or slightly more than their own diameters. Pronotum and mesoscutum moderately shining, alutaceous, obscurely punctate; notauli present only on anterior .1 of mesoscutum; scutellar disc weakly alutaceous, shining. Propodeum 1.4 X as long as broad, disc with weak sculpturing over the entire surface, median carina long but rather weak; spiracles small, subcircular, directed dorsolaterad. Mesopleurum with callus elongate, weakly alutaceous, shining; anterior portion of mesopleurum with large but rather weak punctures. Discoidal vein of fore wing very weakly indicated by a fainly pigmented line.

Paratypes. — ARIZONA: 1 ♂, Southwestern Research Station, 5 mi. W. Portal, Cochise Co., 5400 feet, 23 Aug. 1959

(H. E. Evans) [CU]; 1 ♂, Cottonwood, Yavapai Co., 28 July 1956, swept from alfalfa (Butler & Gerhardt) [UA].

Variation. — The specimen from Cochise County, Arizona, is larger and considerably darker than the type, having the legs and antennae very dark brown. Although closer to the type in size and color, the Cottonwood specimen has the head and thorax more heavily alutaceous and therefore somewhat less shining and less distinctly punctate; in this specimen, also, the clypeal carina is more strongly arched.

Remarks. — The distribution of this species is shown on Map 4.

28. Pseudisobrachium minutissimum new species

Holotype. — ♂, Punta Lobos, 1 mi. SE of Todos Santos, Baja California, 25 Dec. 1958 (H. B. Leech) [CAS].

Description. — Length 2.1 mm.; LFW 1.6 mm. Head black; thorax dark brownish-fuscous; abdomen dark brown, somewhat paler basally and apically; apical three-fourths of mandibles straw-colored, teeth rufous; scape brown, flagellum light brown, very slightly darker apically; coxae and femora medium brown, remainder of legs brown; wings slender, hyaline, veins and stigma brown. Mandibles with four teeth, basal tooth slightly larger than third tooth (Fig. 26). Clypeus narrowly truncate apically, with a median ridge which disappears somewhat before apical margin. Antennae with first four segments in a ratio of about 3:1:1:1, segments three and eleven each barely longer than thick; flagellar pubescence coarse, pale, erect setae numerous, mostly less than half as long as thickness of flagellum. WF .69 X WH, 1.65 X IIE; ocelli small, in a small triangle the front angle of which is less than a right angle; OOL 1.44 X WOT. Eyes rather protuberant laterally, vertex rather narrowly rounded off a distance above eye tops slightly greater than eye height (Fig. 4). Front shining, moderately alutaceous, punctures small, shallow, separated by about twice their own diameters. Vertex and thoracic dorsum more strongly alutaceous and less shining than front; mesoscutum obscurely punctate, notauli weakly developed on anterior .3; disc of scutellum shining. Propodeum 1.4 X as long as broad, disc shining, with reticulate sculpturing which is strongest basally; spiracles small, subcircular, directed dorsolaterad. Mesopleurum weakly alutaceous, obscurely punctate, callus only slightly convex and slightly more shining than remainder of mesopleurum. Discoidal vein of fore wing evident as a very weakly pigmented streak.

Paratypes. — ARIZONA: 2 ♂ ♂, Tucson, June, October (Butler, Crandall) [UA]. NEW MEXICO: 1 ♂, Las Cruces [USNM]. MORELOS: 1 ♂, 12 mi. E. of Cuernavaca, 14 Aug. 1954 (U. Kansas Exp.) [KU]. GUATEMALA: 1 ♂, Yepocapa, 1948-49 (H. T. Dalmat) [USNM].

Variation. — The six available specimens exhibit considerable variation in head measurements, as shown in Table V. The Guatemala specimen has the entire body medium brown, the wing veins very light brown; in the two Tucson specimens the wing veins are also light brown and in all three of these specimens the discoidal vein is very faint. The specimen from Las Cruces, New Mexico, not only has the lateral ocelli relatively rather close to the eyes (OOL 1.17 X WOT), but the entire body is pale castaneous, the setulae on the wing pale, and the veins and stigma nearly colorless. Also, in this specimen the clypeal carina is high and arched basally, rather abruptly declivous just before the apical margin. Some of the color variation in this series may, of course, be due to the fact that some specimens are teneral; in any case it is no greater than that found in several other species.

29. Pseudisobrachium flavicornis (Kieffer) new combination

Holepyris flavicornis Kieffer, 1906, Berlin. Ent. Zeitschr., 50: 246 [Type: ♂, Granada, Nicaragua (Coll. Baker) (Pomona College, Claremont, Calif.)].

Lyssepyris flavicornis Kieffer, 1913, Boll. Lab. Zool. Portici, 7: 108 [Made type of new genus *Lyssepyris*]. — Kieffer, 1914, Das Tierreich, 41: 396-397.

Description of holotype. — Length 3.7 mm.; LFW 2.7 mm. Head piceous, thorax dark brown, abdomen medium brown with indistinct banding with lighter brown; mandibles light yellowish-brown, teeth rufous; antennae yellowish-brown, very slightly darker apically; legs wholly bright straw-yellow; wings hyaline, stigma brown, veins light brown. Mandibles with only three teeth, second tooth small, basal tooth broad, arching into inner mandibular margin (Fig. 28). Clypeus narrowly truncate apically, median carina straight in profile. First four antennal segments in a ratio of about 9:2:3:3, segment three slightly longer than thick, segment eleven about as long as thick; pubescence pale, moderately coarse, about as in *ashmeadi*. WF .70 X WH, 1.50 X HE; ocelli small, DAO .14 X WF; OOL 1.22 X WOT; ocelli well separated, front angle of ocellar triangle slightly less than a right angle. Distance from tops of eyes to vertex crest

equal to slightly less than HE. Front moderately shining, alutaceous, punctures shallow and inconspicuous, separated from one another by slightly more than their own diameters. Pro- and mesonota alutaceous, inconspicuously punctate; notauli moderately strong on anterior .3 of mesoscutum, absent behind. Propodeum short, about 1.4 X as long as broad; disc alutaceous, with strong median and lateral carinae; spiracles small, subcircular, directed dorsad. Mesopleural callus large, slightly depressed midway of its length, shining and non-alutaceous; posterior margin of mesopleurum below callus also shining, remainder of this sclerite weakly alutaceous and with rather strong punctures. Discoidal vein of fore wing weakly pigmented.

Other males examined. — HONDURAS: 2 ♂♂, La Ceiba, 14 Aug. and 2 Dec. 1916 (F. J. Dyer) [USNM, AMNH].

Variation. — One of the two Honduras specimens [AMNH] is strikingly similar to the type in every respect, including size. The other specimen is considerably smaller (LFW 1.9) and has four-toothed mandibles, about as in *ashmeadi;* this specimen is also generally more weakly punctate than the other two.

30. Pseudisobrachium navajo new species

Holotype. — ♂, Tuba City, Coconino Co., Arizona, 27 July 1954 (at light, H. E. and M. A. Evans) [MCZ, No. 30282].

Description. — Length 4.0 mm.; LFW 2.8 mm. Head black, thorax piceous, abdomen dark brown, paler basally and apically; mandibles light brown, teeth rufous; antennae light brown, tinged with rufous beyond third segment; front coxae dark brown, legs otherwise light yellowish-brown; wings hyaline, with pale setulae, stigma light brown, veins nearly colorless. Mandibles with four teeth, basal tooth slightly exceeding third tooth (Fig. 25). Clypeus narrowly truncate apically, median carina high and arched basally, but abruptly declivous well before margin. First four antennal segments in a ratio of about 20:6:7:7, segment three 1.4 X as long as thick, segment nine 1.2 X as long as thick (one antenna broken off at segment five, the other at segment ten); flagellar pubescence coarse, pale, suberect, erect setae numerous, many of them half as long as width of flagellum. WF .71 X WH, 1.48 X HE; DAO .14 X WF; ocelli in a moderately broad triangle, the front angle about a right angle, OOL .94 X WOT. Vertex broadly rounded, in the middle nearly straight across; distance from eye tops to vertex crest equal to .8 X HE. Front strongly alutaceous, somewhat

shining, with numerous shallow but well-defined punctures, these separated by about or slightly more than their own diameters. Pronotum alutaceous, somewhat shining, obscurely punctate. Mesoscutum alutaceous and uniformly covered with small but distinct punctures; notauli rather weakly developed on anterior .3; scutellar disc shining, weakly alutaceous, weakly punctate. Propodeum 1.3 X as long as broad, disc with weak reticulate sculpturing and well-developed median and lateral carinae; spiracles elliptical, directed dorso-laterad. Mesopleural callus convex and shining, remainder of mesopleurum less strongly shining, alutaceous, obscurely punctate. Discoidal vein of fore wing absent.

Paratype. — 1 ♂, Chino Valley, Yavapai Co., Ariz., 27 July 1956 (swept from alfalfa, Butler and Gerhardt) [UA].

Variation. — In the paratype the basal mandibular tooth is slightly broader and shorter than the third tooth and the clypeal carina less abruptly declivous than in the type. In this specimen the notauli are absent and the mesopleurum more distinctly punctate anteriorly.

31. Pseudisobrachium persimile new species

Holotype. — ♂, Lower Lake, Lake Co., Calif., 8 Aug. 1958 (light trap, R. E. Dolphin) [CAS].

Description.—Length 3.3 mm., LFW 3.1 mm. Head and thorax black, abdomen dark brown, paler on sides of basal segments; apical half of mandibles light brown; scape black, flagellum dark brown; legs dark brown except tibiae medium brown, tarsi light brown; wings hyaline, setulae brown, stigma brown, veins light brown. Mandibles with third tooth small, fourth tooth only slightly broader than third tooth. Clypeus truncate apically, median carina not arched in profile. Antennae rather long, first four segments in a ratio of about 20:5:8:8, segment three about twice as long as thick, segment eleven 1.5 X as long as thick; flagellar pubescence short although suberect, erect setae rather prominent, some of them half as long as width of flagellum. WF .71 X WH, 1.67 X HE; ocelli well separated, front angle of ocellar triangle less than a right angle, DAO .17 X WF; OOL subequal to WOT. Head gradually narrowed behind eyes, vertex narrow but nearly straight across; distance from eye tops to vertex crest subequal to HE (Fig. 2). Front shining, alutaceous although not strongly so, punctures weak and barely visible. Pronotum and mesoscutum also shining, moderately alutaceous, obscurely punctate; notauli impressed on anterior half of mesoscutum; disc of scutellum strongly shining. Propodeum elongate,

measuring 1.6 X as long as broad, disc strongly shining though with weak reticulate sculpturing, especially anteriorly; spiracles subcircular, directed dorso-laterad. Mesopleurum elongate, callus elongate and shining, remainder of mesopleurum somewhat alutaceous but without noticeable punctures. Fore wing with discoidal vein barely pigmented, arising a short distance down on transverse median vein. Abdomen slender.

Paratype. — CALIFORNIA: 5 ♂♂, same data as type but three of them 25 July 1958 [UCD, USNM, MCZ]; 3 ♂♂, Upper Lake, Lake Co., 25 July, 8 Aug. 1958 (light trap, R. E. Dolphin) [UCD, MCZ]; 1 ♂, Soda Bay, Lake Co., 25 July 1958 (light trap, R. E. Dolphin) [UCD]; 1 ♂, College City, Colusa Co., 16 July 1959 (light trap, J. Fowler) [UCD]; 1 ♂, Davis, Yolo Co., 24 June 1959 (light trap, F. E. Strong [UCD]; 1 ♂, Sacramento, 20 July 1933 (H. H. Kiefer) [CDAS]; 1 ♂, Vacaville, Solano Co., 31 July 1954 (light trap, E. Mezger) [UCD].

Variation. — The specimen from Vacaville, Davis, and Sacramento have the front and thoracic dorsum more heavily alutaceous and more distinctly punctate than in the series from Lake Co. Variation in standard measurements is not unusual (Table VI).

Female (assigned here tentatively). — Vernon, British Columbia, 9 May 1948 (E. S. Ross) [CAS].

Description of female. — Length 2.8 mm., LH .72 mm., LT 1.2 mm. Entire body pale yellowish-brown; legs and antennae straw-colored. Mandibles with three teeth, the basal tooth weak, about as in Figure 41. Clypeus broadly truncate apically. Head 1.23 X as long as wide, sides subparallel nearly to posterior margin, then arcuately convergent to a very broad, straight vertex. Eyes not discernible. Front wholly rather weakly alutaceous, not strongly shining; punctures absent from median strip, otherwise numerous, separated by about their own diameters, not especially strong and not notably elongated; under side of head strongly alutaceous, weakly punctate. Pronotal disc 1.4 X as long as its posterior width; mesonotum and propodeum each about 1.5 X as long as maximum width. Pronotal disc weakly alutaceous, with weak, widely separated punctures; mesonotum wholly alutaceous, not strongly shining, obscurely punctate on sides; propodeal disc weakly alutaceous, weakly punctate on sides. Mesopleurum strongly alutaceous, dull, obscurely punctate. Hair on body and legs short, pale, moderately abundant.

Remarks. — The males of this species have a general resemblance to those of the sympatric *occidentale*: they are elongate, dark in color, and have a similarly shaped head, although longer behind the eyes. However, the difference in the mandibular dentition readily places these two species in different species-groups. The single female is from a locality far outside the known range of the males (Map 4). The only males I have seen from British Columbia belong to *prolongatum*, the female of which is well known and considerably larger than the female described above. I am hesitant to describe this single female as new, and therefore assign it to *persimile* very tentatively on the assumption that the range of that species is much wider than present evidence indicates.

32. Pseudisobrachium hurdi new species

Holotype. — ♂, 8 mi. S. of Canutillo, Durango, Mexico, 9 Aug. 1951 (P. D. Hurd) [CAS].

Description. — Length 4.3 mm.; LFW 2.9 mm. Head piceous, thorax and abdomen dark reddish-brown; apical half of mandibles yellowish, teeth rufous; scape dark brown, flagellum castaneous; legs medium brown except tarsi light brown; wings hyaline, veins and stigma light brown. Mandibles with third tooth small, fourth tooth broad and arching into inner mandibular margin. Clypeus broadly truncate apically, its truncate margin longer than third antennal segment; median carina high, weakly arched. Antennae with first four segments in a ratio of about 22:5:9:9, segment three 1.5 X as long as thick, segment eleven 1.2 X as long as thick; flagellar pubescence fine, pale, appressed, erect setae mostly less than one fourth as long as width of flagellum. WF .72 X WH, 1.85 X HE; ocelli small, DAO .12 X WF, in a broad triangle, front angle of about a right angle; OOL 1.22 X WOT. Vertex extended far above eye tops, distance from eye tops to vertex crest slightly greater than HE; top of vertex nearly straight across (Fig. 3). Front alutaceous, moderately shining, with distinct punctures which are separated from one another by from one to two times their own diameters. Pronotum and mesoscutum shining, somewhat alutaceous, with sparse but distinct punctures; notauli impressed on anterior .3 of mesoscutum; scutellar disc strongly shining. Propodeum 1.4 X as long as broad, disc shining but wholly alutaceous, median carina strong; spiracles elliptical, directed dorso-laterad. Mesopleurum shining, somewhat alutaceous, anteriorly with small

punctures; callus slightly convex but not otherwise differing from remainder of pleurum. Fore wing with discoidal vein interstitial with median vein, distinct for a distance about equal to basal vein but only very weakly pigmented.

Paratypes. — 5 ♂♂, same data as type (P. D. Hurd, H. E. Evans) [USNM, CIS, MCZ].

Variation. — The five paratypes resemble the holotype closely in size and coloration; there is some variation in the intensity of punctation on the head and thorax, and in two specimens the mesopleural callus is more strongly shining than in the type. The variation in measurements of body parts is not great (Table V).

Remarks. — The six known specimens of this distinctive form were taken at Coleman lanterns which were placed on the ground in semi-arid grassland at about 6000 feet elevation.

33. Pseudisobrachium krombeini new species

Holotype. — ♂, Albuquerque, N. Mex., 14-15 Aug. 1959 (at light, K. V. Krombein) [USNM, no. 65161].

Description. — Length 3.8 mm.; LFW 2.9 mm. Head black, thorax piceous, abdomen dark, shining brown; apical half of mandibles light brown; scape dark brown, flagellum dull brownish-ferruginous; front coxae dark brown, remaining coxae and all femora medium brown, rest of legs light brown; wings hyaline, setulae pale, veins and stigma light brown. Mandibles with third tooth very small, fourth tooth very broad, arching into inner mandibular margin (Fig. 27). Apical truncate margin of clypeus unusually broad, measuring nearly 1.5 X as long as length of third antennal segment (Fig. 50); median clypeal carina arched in profile. Antennae with first four segments in a ratio of about 20:5:8:8, segment three and segment eleven each about 1.3 X as long as thick; pubescence of flagellum pale, the setulae short but suberect, erect setae sparse and short. WF .68 X WH, 1.52 X HE; ocelli small, DAO .15 X WF; ocellar triangle broad, front angle a right angle; OOL 1.06 X WOT. Distance from tops of eyes to vertex crest equal to about .8 HE; vertex nearly straight across. Front alutaceous, somewhat shining, with small but distinct punctures which are separated from one another by 1-2 X their own diameters. Pronotum and mesoscutum strongly alutaceous but somewhat shining, punctures small and rather weak; notauli impressed on anterior .2 of mesoscutum; scutellar disc strongly shining. Propodeum 1.4 X as long as broad, disc alutaceous but shining, median carina giving rise to a few weak transverse carinae; spiracles small,

elliptical, directed dorsad. Mesopleurum with callus elongate, shining and rather weakly alutaceous; anterior ventral part of mesopleurum rugoso-punctate. Discoidal vein of fore wing represented only by a weak, unpigmented streak.

Paratype. — ♂, White Sands, N. Mex., 27 June 1940 (D. E. Hardy) [KU].

Variation. — The single paratype is slightly smaller and paler; the head is piceous, the thorax and abdomen medium brown, the legs and antennae light brown. The notauli are slightly longer, the mesopleural callus somewhat more alutaceous. Variation in head measurements is slight (Table V). The paratype has the front of the head somewhat damaged, making measurement of the anterior ocellus impossible; however, the ocelli seem to be about the same size as in the type.

Rufiventre Species-group

To this group are assigned nine species, of which two are eastern and seven chiefly southwestern in distribution. There are no real differences between this group and the *carbonarium* group; arbitrarily I restrict this group to species with generally larger eyes and ocelli. However, this character is quite tenuous, as several species exhibit considerable variation in eye and ocellar size. Furthermore, *flaviventre* provides an almost perfect intermediate. The females, where known, do not differ in any notable fashion from those of the *carbonarium* group.

34. Pseudisobrachium flaviventre (Kieffer) new combination

Epyris flaviventris Kieffer, 1904, Ark. Zool., 1: 526. [Type: ♂, Texas (Belfrage) (Naturhist. Riksmus. Stockholm, no. 228)].
Xantepyris flaviventris Kieffer, 1913, Boll. Lab. Zool. Portici, 7: 108.
Xanthepyris flaviventris Kieffer, 1914, Das Tierreich, 41: 417.

Description of holotype. — Length 4.0 mm.; LFW 2.9 mm. Head and thorax dark reddish-brown except prothorax somewhat lighter, abdomen bright, pale rufous; mandibles yellowish-brown, teeth rufous; scape straw-colored, flagellum light reddish-brown; legs, including all coxae, light straw-colored; wings hyaline, with pale setulae, stigma light brown, veins almost colorless. Mandibles with third tooth small, fourth tooth broad, rounded into inner mandibular margin. Clypeus truncate apically, median carina straight in profile. Antennae very short, first four segments in a ratio of about 21:5:7:6, segment three about 1.2 X as long as thick, segment eleven 1.1 X as long as thick; pubescence

TABLE VII

Species and locality	No.	LFW	WF/HE	OOL/WOT	DAO/WF	Ant. 11 L/W
flaviventre						
Dover, Del.	1	2.8	1.33	.84	.18	1.0
Chestertown, Md.	1	2.6	1.69	1.13	.13	1.0
Washington, D.C. and vic.	3	2.4 (2.3-2.6)	1.64 (1.53-1.72)	1.26 (1.18-1.32)	.14 (.13-.15)	1.0 (.9-1.1)
Raleigh, N. C.	2	2.8	1.34 (1.31-1.37)	.85 (.82- .88)	.18	1.1
Aiken, S. C.	1	2.2	1.46	1.03	.16	1.0
Roberta, Ga.	2	2.3	1.41 (1.35-1.47)	1.00 (.97-1.30)	.17	1.2
Prattsburg, Ga.	1	2.7	1.28	1.20	.17	1.0
Okefenokee Sw., Ga.	1	2.3	1.58	1.06	.16	1.0
No. Central Fla.	8	2.5 (2.0-3.0)	1.49 (1.35-1.69)	1.02 (.86-1.19)	.17 (.14-.19)	1.0
Sebring, Fla.	1	2.1	1.26	.68	.19	0.9
Okeechobee, Fla.	1	2.1	1.46	1.12	.17	1.0
Everglades Nat. Pk, Fla.	1	2.7	1.45	.95	.19	1.1
Cottondale, Ala.	2	2.0 (1.8-2.2)	1.34 (1.32-1.36)	1.06 (1.00-1.12)	.18 (.17-.19)	1.1
Tuscaloosa, Ala.	8	2.7 (2.1-3.0)	1.40 (1.33-1.50)	.88 (.83- .96)	.18 (.15-.21)	1.1 (1.0-1.2)
Eastern Texas	5	2.6 (2.4-2.9)	1.48 (1.43-1.50)	1.01 (.95-1.07)	.16 (.15-.17)	1.0
Scott Co., Kansas	1	2.6	1.58	1.03	.15	1.1
Illinois	4	2.4 (2.2-2.7)	1.45 (1.42-1.50)	1.08 (1.00-1.12)	.18 (.17-.20)	1.1
ruficventre						
Massachusetts	4	3.0 (2.5-3.4)	1.36 (1.28-1.48)	.95 (.72-1.10)	.19 (.17-.21)	1.3 (1.2-1.4)
Bethany, Conn.	1	3.3	1.20	.95	.22	1.3
Ithaca, N. Y.	1	3.1	1.36	1.00	.19	1.3
New Jersey	6	3.2 (2.8-3.5)	1.34 (1.29-1.37)	1.03 (.94-1.13)	.18 (.17-.19)	1.4 (1.3-1.5)
Delaware	3	3.1 (3.0-3.3)	1.33 (1.23-1.43)	1.01 (.94-1.10)	.19	1.4 (1.3-1.4)
Maryland	11	3.2 (2.6-3.7)	1.32 (1.25-1.35)	1.02 (.89-1.10)	.18 (.16-.21)	1.3 (1.2-1.4)
No. Virginia	12	3.1 (2.5-3.4)	1.31 (1.22-1.38)	.97 (.87-1.12)	.19 (.17-.21)	1.4 (1.2-1.5)
West Virginia	4	3.3 (2.9-3.6)	1.38 (1.33-1.43)	1.09 (1.03-1.21)	.17	1.3
Wake Co., N. C.	2	3.1 (2.8-3.3)	1.22 (1.20-1.24)	.85 (.81-90)	.19	1.4
Dare Co., N. C.	10	2.4 (2.2-2.8)	1.30 (1.23-1.35)	1.04 (.96-1.12)	.17 (.16-.18)	1.2 (1.1-1.3)
Experiment, Ga.	2	3.2	1.20	.83 (.73-.93)	.20 (.18-.22)	1.4
Gainesville, Fla.	1	2.5	1.13	.70	.26	1.2
Orange Co., Fla.	1	3.0	1.31	1.04	.17	1.4
Daytona Beach, Fla.	1	2.1	1.28	.92	.17	1.3
Miami, Fla.	1	2.3	1.18	.78	.25	1.2
Clay Co., Ala.	1	2.9	1.04	.73	.22	1.5
Tuscaloosa, Ala.	1	2.8	1.40	.91	.17	1.2
Harahan, La.	1	2.5	1.27	.90	.20	1.3
comanche						
Santa Cruz Co., Ariz.	2	3.1 (2.8-3.4)	1.21 (1.17-1.25)	.88 (82-.94)	.22	1.4
Pinal Co., Ariz.	3	2.7 (2.6-2.8)	1.14 (1.12-1.17)	.60 (.51-.67)	.24 (.23-.25)	1.7 (1.4-2.0)
Cochise Co., Ariz.	1	2.9	1.26	.95	.22	1.6
Ward Co., Texas	1	2.9	1.04	.52	.30	1.4
pusillum						
Shreveport, La.	6	2.0 (1.6-2.5)	1.24 (1.19-1.28)	.90 (.73-1.0)	19 (.18-.21)	1.2 (1.2-1.3)

of flagellum pale, decidedly coarse and semi-erect, erect setae numerous, many of them nearly half as long as width of flagellum. Front rather broad, WF .71 X WH, 1.40 X HE; ocelli relatively small, DAO .17 X WF; ocelli in a rather broad triangle, front angle nearly a right angle; OOL .88 X WOT. Head very slightly wider than high; vertex very broadly rounded, distance from tops of eyes to vertex crest equal to about .65 X HE; anterior ocellus touching an imaginary line drawn between eye tops. Front alutaceous, somewhat shining, punctures shallow but rather well defined, separated from one another by about their own diameters. Pronotum alutaceous, moderately shining, punctures small but rather distinct. Mesoscutum shining, rather weakly alutaceous, distinctly punctate; notauli strong on anterior .4; scutellar disc strongly shining. Propodeum short, only about 1.2 X as long as broad, disc with reticulate sculpturing anteriorly, median carina strong; spiracles elliptical, directed dorsad.

Mesoscutum wholly somewhat shining, but the callus especially so; callus convex, well differentiated; anterior part of mesopleurum with numerous large punctures. Fore wing with discoidal vein evidenced by only a very faint, unpigmented line (Fig. 60).

Males examined. — DELAWARE: 1, Dover, 4 Aug. 1932 [USNM]. MARYLAND: 1, Chestertown, 30 July 1901 (E. G. Vanatta) [ANSP]. DISTRICT OF COLUMBIA: 1, Washington (C. N. Ainslie) [USNM]. VIRGINIA: 1, Vienna, June (J. C. Bridwell) [USNM]; 1, Arlington, 24 Aug. 1946 (R. H. Beamer) [KU]. NORTH CAROLINA: 2, Raleigh, 26 July 1948 (M. W. King) [USNM]. SOUTH CAROLINA: 1, Aiken, 23 June 1957 (W. R. M. Mason) [CNC]. GEORGIA: 1, Prattsburg, 25 July 1930 (P. W. Oman) [KU]; 2, Roberta, 6 Oct. 1945 (P. W. Fattig) [INHS]; 1, Okefenokee Swamp, 25 July 1939 (R. H. Beamer) [KU]. FLORIDA: 3 Welaka, May (H. E. Evans) [CU]; 1 Sebring, 31 Aug. 1942 (C. T. Parsons) [MCZ]; 1, Old Town, 11 July 1939 (R. H. Beamer) [KU]; 1, Sanford, 21 June 1933 (C. O. Bare) [KU]; 2, Winter Park, May, July (at light, H. T. Fernald) [FSPB]; 1, Okeechobee, 3 April 1953 (J. C. Martin) [CNC]; 1, Paradise Key, Everglades Nat. Pk., 5 April 1952 (G. S. Walley) [CNC]. ALABAMA: 2, Cottondale, 18 June 1957 (at light, W. L. Brown) [MCZ]; 8, Tuscaloosa, July, Aug. (at light, B. D. Valentine) [CU, MCZ]. TEXAS: 4, St. Austin St. Pk., nr. Sealy, 14-16 June 1956 (at light, H. E. Evans and E. G. Matthews) [CU, MCZ]; 1, Richmond, Fort Bend Co., 22 June 1917 [MCZ]; 1, (Belfrage) [type, Stockholm Mus.]. KANSAS: 1, Scott Co., 14 Aug. 1951 (at light, H. E. Evans) [KSU]. ILLINOIS: 2, Carterville, Williamson Co., Aug. 1958 (V. Cole) [UCD]; 1, Urbana, 4 Sept. 1945 (at light, H. H. Ross) [INHS]; 1, Golconda, 7 July 1944 (at light, Sanderson & Leighton) [INHS].

Variation. — The 43 specimens examined vary in length from 2.1 to 4.2 mm., fore wing from 1.8 to 3.0 mm. The abdomen is brown in specimens from Maryland, District of Columbia, and Arlington, Virginia, while the whole body is very light brown in the specimen from Vienna, Virginia; otherwise the rufous abdomen contrasts conspicuously with the head and thorax. The antennae show little variation in length and color, but there is much variation in the width of the front and in the length of the ocello-ocular line as compared to the width of the ocellar triangle (Table VII). Some of the latter variation is a result

of differences in the shape of the ocellar triangle, which, however, is seldom as compact as in *rufiventre* or as broad as in *rectangulatum*.

Female (assigned here tentatively). — ALABAMA: Tuscaloosa Co., 6 April 1949, under stone on dry cut-over hillside (B. D. Valentine) [MCZ].

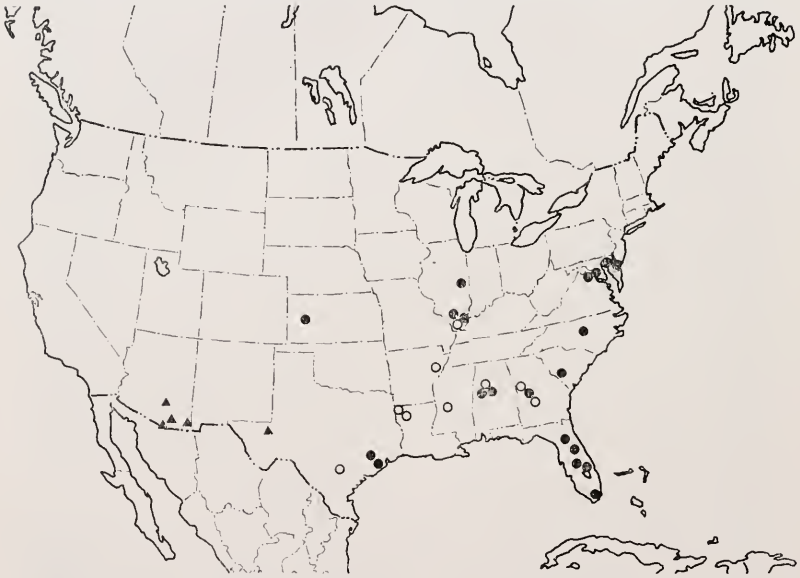
Description of female. — Length 3.2 mm., LH .58 mm., LT 1.1 mm. Entire body light castaneous; tips of mandibles rufous; antennae light castaneous, fading to dull yellowish-brown apically; legs straw-colored. Mandibles very slender, with three apical teeth, the basal tooth very small (Fig. 41). Clypeus broadly truncate, median carina strong, not reaching apical margin. Head 1.25 X as long as wide, sides very weakly, gradually convergent to near posterior margin, where they are more strongly, arcuately convergent to a broad, straight vertex. Eyes small, not larger than one of head punctures, barely distinguishable. Head strongly shining, weakly alutaceous except barely so medially and posteriorly, punctures large, posteriorly separated by about or slightly more than their own diameters, anteriorly somewhat more crowded (punctures absent from median strip); under side of head alutaceous, punctures rather weak, evenly spaced. Pronotal disc 1.35 X as long as its posterior width; mesonotum 1.4 X as long as wide; propodeum 1.4 X as long as wide. Pronotum strongly shining, with well separated, fairly strong punctures except along midline; mesonotum strongly shining, weakly alutaceous laterally; propodeum very strongly polished, with a few weak punctures on extreme sides of dise. Mesopleurum weakly alutaceous, weakly punctate. Hairs of body and legs short, pale, abundant.

Other females. — GEORGIA: 2, Peach Co., May, Sept. (in soil) [USNM]; 3, Upson Co., March, July, Aug. (W. F. Turner) [USNM]. MISSISSIPPI: 1, Ridgeland, Madison Co., 20 May 1959 (forest debris, Ross & Stannard) [INHS]. LOUISIANA: 7, Bossier Par., Feb., May, Sept., Oct. (soil of peach orchard, W. F. Turner) [USNM]; 1, Caddo Par., 13 Sept. 1937 (soil of peach orchard, W. F. Turner) [USNM]. TEXAS: 6, Bexar Co., July, Sept. (soil of peach orchard, W. F. Turner) [USNM]. ARKANSAS: 1, St. Francis Co., 13 June 1936 (in soil, W. F. Turner) [USNM]. ILLINOIS: 1, Little Grassy Lake, Williamson Co., 10 Aug. 1958 (oak-hickory woods, in leaf litter in or near nest of *Solenopsis* of group *molesta* Say, W. L. Brown) [MCZ].

Variation in females. — Head length varies from .47 to .60 mm. (mean .56 mm.); LH/WH varies from 1.22 to 1.35 (mean 1.28);

thorax length varies from 0.8 to 1.1 mm. (mean about 1.0 mm.). Smaller specimens tend also to be slightly more slender (pronotum 1.5 X as long as wide, mesonotum 1.6, propodeum about 1.5 X as long as wide). While most specimens agree closely in color with the one described above, in the Illinois specimen the head is medium castaneous, darker than the thorax and abdomen, while in the Mississippi specimen the whole body is rich medium castaneous. In some of the specimens from Bossier Parish, La., the head punctures are somewhat weaker and more widely spaced than described above.

Remarks. — Collecting records indicate that the males are nocturnal. The species seems especially characteristic of the Gulf



Map 5. — Distribution of *P. flaviventre*, males indicated by solid circles, supposed females by hollow circles. Distribution of *P. comanche*, males indicated by solid triangles (females unknown).

Coast states and ranges northward in smaller numbers to Illinois and to Delaware. This sex association is highly tentative and is based on coincidence of distribution of females (Map 5) as well as structure intermediate between *ashmeadi* and *rufiventre* (as is characteristic of the males).

Separation of both sexes from the largely sympatric species *ashmeadi* and *rufiventre* is difficult. The females are about the

same size as those of *ashmeadi* but have the head more alutaceous and closely punctate, somewhat less so than in the slightly larger species *rufiventre*. In the males, the abdomen is usually rufous in *flaviventre*, occasionally rufous in *rufiventre*, and never rufous in *ashmeadi*. The antennae are only occasionally as short in *rufiventre* and *ashmeadi* as in *flaviventre*, and the mesopleurum is not of quite the same configuration. In *ashmeadi* and *rufiventre* the wings tend to have darker veins and setulae and the discoidal vein is distinctly pigmented; however, occasional specimens are difficult to place on this character alone.

35. Pseudisobrachium rufiventre (Ashmead)

Isobrachium rufiventre Ashmead, 1893, Bull. U. S. Nat. Mus., 45: 38-39. [Type: ♀, Occoquan Falls, Va., 5 Aug. 1885, under stone (T. Pergande) (USNM no. 2186); allotype: ♂, on same pin].

Pseudisobrachium rufiventre Kieffer, 1908, Genera Insect., 76: 24. — Kieffer, 1914, Das Tierreich, 41: 480. — Fouts, 1928, Proc. Ent. Soc. Wash., 30: 122.

Pseudisobrachium flavicoxis Fouts, 1928, Proc. Ent. Soc. Wash., 30: 122. [Type: ♀, Baldwin, Kansas (USNM no. 62548)]. New synonymy.

Pseudisobrachium puncticeps Fouts, 1928, Proc. Ent. Soc. Wash., 30: 123-124. [Type: ♂, Glen Echo, Md., 19 Aug. 1916 (at light, R. Fouts) (USNM no. 62550)]. New synonymy.

Description of male allotype. — Length 3.3 mm., LFW 2.6 mm. Head and thorax dark reddish-brown, abdomen slightly paler and with indistinct banding with light brown, especially basally; mandibles light brown, teeth rufous; scape brown, flagellum dull reddish-brown; legs wholly light brown; wings hyaline, setulae brown, veins and stigma brown. Mandibles with third tooth small, basal tooth broad, as in other species of this complex. Apical margin of clypeus subtruncate. Antennae with first four segments in a ratio of about 18:5:8:8, segment three about 1.4 X as long as thick, segment eleven 1.3 X as long as thick; flagellar pubscence unusually coarse and suberect, erect setae numerous, more erect though not very much longer than the pubescence. Front rather narrow, WF .64 X WH, 1.23 X HE; ocelli of moderate size, DAO .21 X WF, in a compact triangle, posterior ocelli separated by hardly more than their own diameter; OOL and WOT subequal. Eyes weakly bulging, head gradually contracted behind eyes to a rather broadly rounded vertex; distance from eye tops to vertex crest about .8 X HE (Fig. 5). Front alutaceous, moderately shining, obscurely punctate. Pro- and mesonota also moderately shining though alutaceous, mesoscutum with shallow punctures which, on the sides, are separated

by little more than their own diameters; notauli strong on anterior half of mesoscutum. Propodeum about 1.5 X as long as broad, in lateral view twice as long as high; spiracles elliptical, directed dorso-laterad; disc somewhat shining, weakly alutaceous, with some reticulate sculpturing at extreme base. Mesopleurum shining, weakly alutaceous, callus convex though not well separated or differing notably from mesopleurum below and behind it; anterior part of mesopleurum only weakly punctate. Fore wing with discoidal vein arising slightly below junction of basal and transverse median veins, pigmented to a distance greater than length of basal vein.

Males examined. — MASSACHUSETTS: 1, Cambridge, Aug. 1932 (J. Bequaert) [MCZ]; 2, Holliston, 3-7 Sept. (N. Banks) [MCZ]; 1, Framingham (C. A. Frost) [MCZ]. NEW YORK: 1, Ithaca, 11 Aug. 1937 (at light, P. P. Babiy) [CU]. CONNECTICUT: 1, Bethany, 16 Oct. 1960 (found dead in light shade, H. E. Evans) [MCZ]. NEW JERSEY: 2, Pemberton, 5 Aug. 1939 (H. K. Townes) [HKT]; 1, Butler, 1955 (R. Dorland) [CU]; 1, Ramsey, 29 July 1917 [AMNH]; 1, Lakehurst, 9 Aug. 1959 (D. Anderson) [CU]; 1, Moorestown, 11 Aug. 1939 (H. & M. Townes) [HKT]. DELAWARE: 1, Dover [USNM]; 2, Ship John L. H., Delaware Bay, 22 Aug. 1936 [USNM]. MARYLAND: 1, Snow Hill, 5 July 1933 (F. C. Bishop) [USNM]; 2, Plummer's Island, 23 Sept. 1960 (H. E. Evans) [MCZ]; 1, Annapolis, 1933 [USNM]; 6, College Park, July, Aug. 1933 (F. C. Bishop) [USNM]; 1, Glen Echo, 19 Aug. 1916 (R. Fouts) [USNM]. WEST VIRGINIA: 2, French Creek, Upshur Co., Sept. 1938 (G. E. Wallace) [CM]; 2, Shaver's Fork, Tucker Co., Oct. 1938 (GEW) [CM]. VIRGINIA: 6, Vienna, June-Aug. (J. C. Bridwell) [USNM]; 4, Arlington, Aug., Sept. [KVK, MCZ]; 1, Olney, 16 Aug. 1933 (F. C. Bishop) [USNM]; 1, Falls Church, 16 Aug. (N. Banks) [MCZ]; 1, Occoquan Falls, 5 Aug. 1885 [USNM]. NORTH CAROLINA: 2, Wake Co., July (H. & M. Townes) [HKT]; 10, Kill Devil Hills, Dare Co., July, Sept. (at light, K. V. Krombein) [KVK]. GEORGIA: 2, Experiment, 11 Aug. 1929 (T. Bissell) [USNM]. FLORIDA: 1, Gainesville, 10 July 1957 (at light, H. V. Weems) [FSPB]; 1, Orange Co., 21 Dec. 1929 (J. E. Sadler) [USNM]; 1, Daytona Beach, 26 July 1945 (G. T. Riegel) [INHS]; 1, Miami, 14 Sept. 1950 (F. G. Butchers) [CNC]. ALABAMA: 1, Clay Co., (H. H. Smith) [USNM]; 1, Tuscaloosa, 5 July 1949 (B. D. Valentine) [MCZ]. LOUISIANA: 1, Harahan, 1 Sept. 1944 (C. L. Remington) [INHS].

Variation in males. — The 60 males examined vary in size from 2.6 to 5.1 mm., fore wing from 2.1 to 3.7 mm. The head is black or nearly so in several specimens. The color of the abdomen varies from dark brown with paler annulations basally to wholly rufous; the majority of specimens are intermediate, as in the allotype. The antennae and legs are frequently paler than in the allotype. There is a tendency for specimens from southern parts of the range to exhibit lighter colors, but not all specimens fall in with this trend. Variation in ocellar size, width of front, and antennal length is recorded in Table VII. In occasional specimens the front is more strongly punctate than described for the allotype.

Description of female holotype. — Length 3.7 mm., LH .8 mm., LT 1.5 mm. Head and thorax bright rufo-castaneous, head slightly darker than thorax; abdomen light orange-brown; clypeus and antennae light castaneous; legs yellowish-brown, approaching amber. Mandibles with three teeth, basal tooth weak, as shown in Figure 40. Clypeus broadly truncate, median ridge strong. Head 1.18 X as long as wide, sides subparallel to just before posterior margin, where they are arcuately convergent to a broad, straight vertex. Eyes small, colored like head, barely distinguishable. Front somewhat alutaceous, weakly or barely so behind, more evidently so antero-laterally, where there is a weak tendency for the formation of longitudinal striae; punctures elongate, absent from median strip but otherwise separated by about or slightly less than their own diameters, though less crowded anteriorly than in *prolongatum;* under side of head strongly alutaceous, rather weakly punctate. Pronotal disc rather short, 1.3 X as long as its posterior width; mesonotum 1.5 X as long as wide; propodeum about 1.4 X as long as wide. Pronotum polished, barely alutaceous and not at all so medially, punctures strong but absent from median strip. Mesonotum weakly alutaceous and punctate, but center of disc smooth and shining. Propodeum shining, very weakly alutaceous, sides of disc with a number of well-defined punctures extending out onto median area more than in *prolongatum.* Mesopleurum alutaceous, weakly punctate laterally. Body and legs with setae golden, mostly rather short.

Other females. — VIRGINIA: 1, Barcroft, 9 Sept. 1934 (J. C. Bridwell) [USNM]; 1, Alexandria, 24 June 1934 (J. C. Bridwell) [USNM]; 1, Fort Lee, 10 April 1903 [MCZ].[6] MASSACHUSETTS: 1, Blue Hills, Canton, 20 July 1956 (in nest of

[6] No state is indicated on the label of this specimen; there is also a Fort Lee in northern New Jersey.

Formica obscuriventris under rock, W. L. Brown) [MCZ]. KANSAS: 1, Baldwin [USNM].

Variation in females. — The Virginia specimens show only very slight variation in size, color, and other characters. The Massachusetts specimen is somewhat smaller, length of body 3 mm., of head .68 mm., of thorax 1.25 mm. It is somewhat lighter in color, the head being castaneous, the thorax and abdomen light castaneous; the mandibles, clypeus, and lower sides of the head are light yellowish-brown, the legs straw-colored. In this specimen the head punctures are slightly more widely spaced and for the most part less elongate. The Kansas specimen (type of *flavicoxis* Fouts), although from outside the otherwise known range of *rufiventre,* differs from the type of that species in no important way except that it is slightly paler, with the coxae bright yellowish as indicated by Fouts.

Remarks. — The distribution of this species is shown on Map 6.

Map 6. — Distribution of *P. rufiventre,* males indicated by solid circles, females by hollow circles. Distribution of *P. foutsi,* males indicated by solid triangles (females unknown).

36. Pseudisobrachium pusillum new species

Holotype. — ♂, Shreveport, La., 22 June 1949 (light trap, J. H. Robinson) [INHS].

Description. — Length 2.0 mm., LFW 1.8 mm. Head piceous, thorax dark castaneous, abdomen medium brown, paler on sides of basal segments; mandibles light brown basally, apical half straw-colored, teeth rufous; antennae brown, flagellum somewhat paler beneath; legs brown, tarsi and apices of tibiae paler; wings hyaline, setulae dark, veins and stigma brown. Mandibles with four teeth, basal two teeth both strong, basal tooth somewhat thicker than third tooth. Clypeus truncate apically. Antennae with first four segments in a ratio of about 10:4:5:5, segments three and eleven each about 1.2 X as long as thick; flagellar pubescence unusually coarse, suberect, erect setae also numerous. Front of moderate breadth, WF .61 X WH, 1.25 X HE; front angle of ocellar triangle less than a right angle, ocelli only slightly enlarged, DAO .20 X WF; OOL .95 X WOT. Distance from eye tops to vertex crest .8 X HE. Front alutaceous, moderately shining, obscurely punctate. Pro- and mesonota rather strongly alutaceous, including even scutellar disc, obscurely punctate; notauli impressed on anterior .2 of mesoscutum. Propodeum about 1.7 X as long as wide, disc weakly alutaceous, depressed and carinate medially. Mesopleurum wholly alutaceous, obscurely punctate, callus small but convex. Fore wing with discoidal vein present, weakly pigmented.

Paratypes. — LOUISIANA: 3 ♂ ♂, same data as type [INHS, MCZ], 1 ♂, same data but 6 Aug. 1948 [USNM], 1 ♂, same data but 28 July 1949 [CNC].

Variation. — The five paratypes show little variation in size and in standard measurements (Table VII). They do, however, exhibit considerable variation in the degree to which the vertex is extended above the eye tops; in one specimen the distance from the eye tops to the vertex measures only about .6 X HE, in two others .7, in another .8 (like the type), in another .9.

Female (assigned here tentatively). — ARKANSAS: Pike Co., 12 May 1948 (peach orchard, Turner) [USNM].

Description. — Length 1.8 mm., LH .40 mm., LT .73 mm. Head light castaneous, thorax and abdomen light yellowish-brown; antennae light castaneous, fading to dull straw-yellow apically; legs straw-colored. Mandibles with three teeth, apical two teeth large and somewhat splayed out, basal tooth small. Clypeus broadly subtruncate apically, its median carina very

sharp, reaching apical margin. Head 1.45 X as long as wide, sides weakly bulged midway, convergent behind to a broad, straight vertex. Eyes not distinguishable. Front shining, non-alutaceous, punctures small, shallow, separated for the most part by much more than their own diameters; under side of head shining, non-alutaceous, weakly punctate. Pronotal disc 1.5 X as long as its posterior width; mesonotum 1.6 X as long as wide; propodeum about 1.5 X as long as wide. Pro- and mesonota strongly shining, weakly punctate except medially, in part obscurely alutaceous. Propodeal disc very strongly shining, non-alutaceous, impunctate. Mesopleurum alutaceous, obscurely punctate. Hairs of body and legs short and pale.

Other females. — 1, same data as type [USNM].

Variation. — The second specimen measures 2.0 mm. long, head .42 mm., thorax .78 mm. The sides of the head are slightly more bulging, such that the head is only 1.37 X as long as wide.

37. PSEUDISOBRACHIUM COMANCHE new species

Holotype. — ♂, Peña Blanca, Santa Cruz Co., Arizona, 3950 feet elevation, 24 Aug. 1959 (at light, H. E. Evans) [MCZ, No. 30287].

Description. — Length 3.2 mm., LFW 2.8 mm. Head and thorax piceous, abdomen dark brown, paler on sides of basal segments; apical two-thirds of mandibles yellowish-brown, teeth rufous; antennae dull reddish-brown; front coxae infuscated, legs otherwise bright reddish-brown; wings hyaline, setulae brownish, veins and stigma brown. Mandibles with third tooth very small, fourth tooth broad; clypeus subtruncate apically. Antennae elongate, first four segments in a ratio of about 17:5:7:7, segment three 1.7 X as long as thick, segment eleven 1.4 X as long as thick; flagellar pubescence coarse, suberect, erect setae numerous, on basal segments some of them more than half as long as width of flagellum. Front narrow, WF .58 X WH, 1.17 X HE; ocelli in a compact triangle, front angle less than a right angle, slightly enlarged, DAO .22 X WF; OOL .82 X WOT. Eyes very prominent laterally, head contracted behind them to a rather narrowly rounded vertex; distance from eye tops to vertex crest about .6 X HE. Front alutaceous, moderately shining, punctures shallow and inconspicuous. Pronotum and mesoscutum alutaceous, somewhat shining, the latter somewhat more evidently punctate than the former; notauli distinct on anterior .3 of mesoscutum; scutellar disc shining. Propodeum about 1.6 X as long as broad, in

lateral view 2.6 X as long as high; disc weakly sculptured, somewhat polished; spiracles elliptical, directed dorso-laterad. Mesopleurum wholly alutaceous, with some large, shallow punctures anteriorly. Fore wing with discoidal vein lightly pigmented to about length of basal vein (Fig. 59).

Paratypes. — ARIZONA: 1 ♂, Madera Canyon, Santa Rita Mts., 4880 feet, 24 Aug. 1959 (J. G. Franclemont) [CU]; 3 ♂ ♂, 4 mi. W. Superior, Pinal Co., May, July (H. K. Gloyd) [INHS, USNM, MCZ]; 1 ♂, SW Research Station, 5 mi. W. Portal, Cochise Co., 5400 feet, 11 Sept. 1959 (H. E. Evans) [MCZ]. TEXAS: 1 ♂, 1 mi. E. Barstow, Ward Co., 10 July 1956 (E. G. Matthews) [CU].

Variation. — The six paratypes range in size from 3.0 to 3.9 mm., fore wing from 2.6 to 3.4 mm. There is considerable variation in ocellar size and antennal length (Table VII); the specimens from the Santa Ritas and the Chiricahuas not only have relatively small ocelli but also have the head longer behind the eyes (distance from eye tops to vertex crest about .8 X HE). Otherwise the series is of rather uniform appearance.

Remarks. — The distribution of this species is shown on Map 5.

38. Pseudisobrachium apache new species

Holotype. — ♂, Peña Blanca, Santa Cruz Co., Arizona, 3950 feet elevation, 24 Aug. 1959 (at light, H. E. Evans) [MCZ, No. 30288].

Description. — Length 4.4 mm.; LFW 3.7 mm. Head black, thorax very dark brown, abdomen medium brown with indistinct banding with light brown on posterior parts of segments; apical half of mandibles light brown, teeth rufous; scape dark brown, flagellum medium brown; front coxae dark brown, legs otherwise straw-colored; wings hyaline, stigma brown, veins light brown. Mandibles with four teeth, third tooth smaller than broadly rounded basal tooth. Clypeus with apical margin slightly convex (Fig. 46), median carina high, arched in profile. Antennae with first four segments in a ratio of about 25:7:12:11, segment three nearly twice as long as maximum width, segment eleven 1.7 X as long as wide; pubescence of flagellum light, golden brown, suberect, moderately coarse, erect setae numerous but mostly rather short. WF .60 X WH, 1.10 X HE; ocelli rather large, DAO .25 X WF; posterior ocelli rather close together, front angle of ocellar triangle less than a right angle; OOL .57 X WOT. Eyes strongly bulging, measuring 1.25 X as high as wide; distance from eye tops to vertex crest equal to about half eye height. Front alutaceous, moderately shining, punctures

small, shallow, relatively inconspicuous. Pro- and mesonota strongly polished, hardly at all alutaceous, punctures small but (especially on mesoscutum) sharply defined and rather evenly spaced; notauli strong on anterior half of mesoscutum. Propodeum 1.7 X as long as wide; disc shining though with weak microscopic sculpturing; spiracles narrowly elliptical, directed dorsad. Mesopleurum strongly shining, with some sculpturing anteriorly and posteriorly; callus elongate, very weakly alutaceous. Discoidal vein of fore wing a scarcely pigmented streak which arises a short distance down on transverse median vein.

Paratypes. — ARIZONA: 1 ♂, Patagonia, Santa Cruz Co., 14 Oct. 1927 (J. A. Kusche) [CAS]; 3 ♂ ♂, Globe, Gila Co., July 1949 (at light) [USNM]; 7 ♂ ♂, 4 mi. W. Superior, Pinal Co., May-Aug. 1946-49 (at light, H. K. Gloyd, B. W. Benson) [INHS, MCZ, CU].

Variation. — The 12 available specimens range in size from 3.5 to 5.0 mm., fore wing from 3.0 to 3.9 mm. In one specimen from Globe the front is somewhat more shining than in the type, and in another specimen from that locality and one from Superior the pro- and mesonota are very weakly alutaceous; however, in every case there is marked contrast between the front and the thoracic dorsum in this regard. The amount of variation in antennal length and head measurements is unusually small (Table VIII).

39. Pseudisobrachium foutsi new species

Isobrachium montanum Ashmead, 1893, Bull. U. S. Nat. Mus., 45: 39. [♂ allotype, "Arizona" (USNM); ♀ holotype = *P. prolongatum* Prov.].

Holotype. — ♂, Port Isabel, Cameron Co., Texas, 23-27 June 1956 (at light, H. E. Evans & E. G. Matthews) [MCZ, No. 30289].

Description. — Length 4.6 mm., LFW 2.8 mm. Head dark reddish-brown, thorax castaneous, abdomen yellowish-brown except first tergite infuscated basally, all tergites somewhat paler apically; mandibles yellowish-brown, darker basally and apically; antennae light castaneous; legs wholly bright yellowish-brown; wings hyaline, with pale setulae, stigma light brown, veins pale amber. Mandibles with third tooth smaller than broad basal tooth; clypeus narrowly truncate apically (Fig. 29). Antennae with first four segments in a ratio of about 4:1:2:2, segments three and eleven each about 1.5 X as long as thick; flagellar pubescence pale, coarse, suberect, erect setae numerous but not

much longer than pubescence. Front narrow, WF .62 X WH, 1.10 X HE; ocelli enlarged, in a rather compact triangle the front angle of which is distinctly less than a right angle; DAO .26 X WF; OOL .64 X WOT. Eyes only slightly bulging, head gradually narrowed behind eyes, distance from eye tops to vertex crest about .65 X HE. Front alutaceous, weakly shining, punctures shallow and inconspicuous. Pro- and mesonota also alutaceous and rather weakly shining, obscurely punctate except somewhat more evidently so on sides of mesoscutum; notauli weakly impressed on anterior .2 of mesoscutum; scutellar disc shining but alutaceous and weakly punctate. Propodeum 1.6 X as long as broad, disc shining, weakly alutaceous but with some reticulate sculpturing anteriorly; spiracles elongate-elliptical, directed dorso-laterad. Mesopleurum wholly alutaceous, weakly punctate anteriorly, callus weakly differentiated. Fore wing with discoidal vein indicated by a faint, unpigmented streak which is interstitial with median vein (Fig. 61).

Paratypes. — TEXAS: 23 ♂♂, Port Isabel, Cameron Co., all same data as type except 2 ♂♂ 20-23 June 1948 (at light, H. E. Evans) [MCZ, CU, USNM]; 3 ♂♂, Lolita, Jackson Co., 6 July 1916 (at light, J. D. Mitchell) [USNM]; 4 ♂♂, Gillett, Karnes Co., 25 June 1917 (J. C. Bradley) [CU]; 1 ♂, Helotes, Bexar Co., 1 July 1917 (J. C. Bradley) [CU]; 16 ♂♂, Kerrville, Kerr Co., July 1952-53 (light trap, L. J. Bottimer) [USNM]; 24 ♂♂, Brazos River, Richmond, Ft. Bend Co., 22 June 1917 (at light, J. C. Bradley) [CU]; 1 ♂, Ft. Hood, Bell Co., 21 July 1955 (E. G. Matthews) [CU].

Other material examined. — The following specimens are assigned here tentatively but are not to be considered paratypes: TEXAS: 4 ♂♂, Brownsville, Cameron Co., June, Sept., Oct. [USNM, CAS, KU]; 1 ♂, Mission, Hidalgo Co., 27 Sept. 1951 (Cartwright & Gurney) [USNM]; 1 ♂, Knippa, Uvalde Co., 3 July 1910 (F. C. Pratt) [USNM]; 1 ♂, Juno, Val Verde Co., 3 July 1917 (J. C. Bradley) [CU]; 1 ♂, Lozier Canyon, Terrell Co., 8 July 1948 (at light in desert, Werner & Nutting) [USNM]; 1 ♂, Limpia Canyon, Davis Mts., 7 July 1917 (J. C. Bradley) [CU]; 1 ♂, "Tex." [ANSP]. NEW MEXICO: 2 ♂♂, Roswell, 17 Aug. 1951 (at light, H. E. Evans) [MCZ]; 2 ♂♂, Lordsburg, 13-17 July 1917 (J. C. Bradley, J. Bequaert) [CU, MCZ]; 5 ♂♂, Deming, 12-17 July (W. M. Wheeler) [MCZ]. ARIZONA: 1 ♂, Portal, Cochise Co., 5 Sept. 1959 (at light, H. E. Evans) [CU]: 1 ♂, Paradise, Cochise Co., 17 Sept., 1927 (J. A. Kusche) [CAS]; 4 ♂♂, Texas Canyon, Cochise Co., Sept.,

Oct. (J. A. Kusche) [CAS]; 6 ♂♂, Willcox, 3 Sept. 1959 (at light, H. E. Evans) [CU, MCZ]; 1 ♂, Huachuca mts., 14 Sept. 1933 (R. H. Crandall) [UA]; 2 ♂♂, Safford, 23 June 1954 (light trap, F. G. Werner) [UA]; 10 ♂♂, 4 mi. W. Superior, Pinal Co., May, July (at light, H. K. Gloyd) [INHS]; 2 ♂♂, Canelo, Santa Cruz Co., 10 July 1957 (G. D. Butler) [UA]; 1 ♂, Patagonia, Santa Cruz Co., 14 Oct. 1927 (J. A. Kusche) [CAS]; 2 ♂♂, Tucson, Aug. (R. H. Crandall) [UA]; 1 ♂, Tuba City, Coconino Co., 27 July 1954 (at light, H. E. & M. A. Evans) [CU]. CALIFORNIA: 32 ♂♂, Blythe, Riverside Co., 6-20 Aug. 1947 (light trap, J. W. MacSwain) [CIS, MCZ]; 1 ♂ Thermal, Riverside Co., 17-18 Aug. 1927 [CU]; 6 ♂♂, Riverside, 24 Sept. 1935 (H. H. Keifer) [CDAS]; 1 ♂, El Centro, Imperial Co., 11 Sept. 1959 (light trap, C. R. Waegner) [CDAS]; 1 ♂, Chula Vista, San Diego Co., 26 Sept. 1935 (H. H. Keifer) [CDAS]; 1 ♂, Lancaster, Los Angeles Co., 26 Aug. 1958 (in alfalfa field, E. I. Schlinger) [USNM]; 1 ♂, 8 mi. NW Winters, Yolo Co., 22 July 1959 (light trap, J. Fowler) [UCD]. COAHUILA: 1 ♂, Tanque de Malone, La Bahia, 20 June 1938 (R. H. Baker) [USNM].

Variation. — The amount of variation in this species is bewildering, and I concede the possibility that I may be confusing several species under one name. Most specimens from eastern Texas agree reasonably well in size, color, and standard measurements, and I have little doubt that they are conspecific with the Port Isabel type; I have therefore designated these specimens as paratypes. Specimens from southern and western Texas, Coahuila, New Mexico, Arizona, and California may be in part or wholly conspecific with the type series; I have identified these specimens as *foutsi* but prefer not to designate them as paratypes.

The smallest specimen in the entire series is from Lancaster, California (length 1.6 mm., LFW 1.6 mm.) while the largest is from Texas Canyon, Arizona (length 4.7 mm., LFW 3.6 mm.). Specimens from western parts of the range tend to be darker in color; for example, the series from Willcox, Arizona, and most California specimens have the entire body dark brown and the antennae and legs brown. On the other hand, the specimens from Blythe, California, have the abdomen rufous and the legs wholly straw-colored. The two specimens from Canelo, Arizona, are similarly colored, but in these the front is unusually strongly punctate. In two of the four Brownsville, Texas, specimens the head is rather long behind the eyes (distance from eye tops to vertex crest .7-.9 X HE), and this is true of many Arizona and most California specimens, though there is much variation in

this regard in most series from one locality. In some specimens (mainly of somewhat peripheral distribution, see Table VIII) the ocelli are enlarged only slightly. The broadest front occurs in the series from Riverside, California, although this is approached by specimens from other California, Arizona, and New Mexico localities. The mandibles of some Arizona specimens have the basal tooth scarcely any wider than the third tooth (Fig. 30).

Remarks. — This nocturnal, chiefly deserticolous species is named for Robert M. Fouts, of Laredo, Texas, the only North American worker to have directed attention to these wasps up to this time. The female has yet to be discovered. The distribution is shown on Map 6.

TABLE VIII

Species and locality	No.	LFW	WF/HE	OOL/WOT	DAO/WF	Ant. II L/W
foutsi						
Richmond, Tex.	24	2.6 (2.1-3.0)	1.3 (1.05-1.21)	.62 (.53-.69)	.28 (.25-.31)	1.2 (1.1-1.3)
Ft. Hood, Tex.	1	2.6	1.06	.50	.30	1.4
Helotes, Tex.	1	2.9	1.00	.40	.31	-
Gillett, Tex.	4	2.2 (2.0-2.7)	1.17 (1.06-1.33)	.64 (.47-.75)	.24 (.18-.29)	1.1 (1.0-1.3)
Lolita, Tex.	3	2.6 (2.3-2.9)	1.22 (1.14-1.35)	.57 (.54-.62)	.27 (.25-.28)	1.3 (1.2-1.4)
Mission, Tex.	1	2.8	1.34	.88	.18	1.5
Brownsville, Tex.	4	2.7 (2.4-3.0)	1.13 (.93-1.27)	.61 (.40-.76)	.28 (.23-.39)	1.3 (1.0-1.5)
Port Isabel, Tex.	24	2.4 (1.9-2.8)	1.20 (1.13-1.30)	.70 (.62-.79)	.24 (.23-.26)	1.2 (1.0-1.4)
Kerrville, Tex.	16	2.4 (1.8-2.9)	1.05 (.95-1.16)	.56 (.39-.91)	.29 (.20-.33)	1.3 (1.1-1.5)
Knippa, Tex.	1	1.9	1.22	.70	.20	1.1
Juno, Tex.	1	1.8	1.22	.80	.20	1.0
Terrell Co., Tex.	1	1.9	1.11	.56	.27	1.3
Jeff Davis Co., Tex.	1	2.5	1.15	.55	.25	1.3
Roswell, N. Mex.	2	3.0 (2.9-3.1)	1.15	.51 (.50-.52)	.26 (.25-.27)	1.2
Lordsburg, N. Mex.	2	2.9	1.28 (1.18-1.38)	.59 (.42-.76)	.26 (.22-.30)	1.3
Deming, N. Mex.	5	3.2 (3.0-3.4)	1.48 (1.33-1.59)	.71 (.64-.77)	.21 (.18-.24)	1.3 (1.2-1.4)
Cochise Co., Ariz.	13	2.9 (1.9-3.6)	1.28 (1.12-1.48)	.68 (.52-.87)	.23 (.17-.27)	1.3 (1.1-1.5)
Safford, Ariz.	2	2.8	1.37 (1.34-1.40)	.73 (.69-.76)	.23 (.22-.24)	1.1
Superior, Ariz.	8	2.4 (1.9-2.8)	1.26 (1.17-1.36)	.85 (.80-.91)	.22 (.21-.24)	1.3 (1.2-1.4)
St. Cruz Co., Ariz.	3	3.3 (3.2-3.4)	1.27 (1.20-1.34)	.77 (.70-.85)	.21 (.20-.23)	1.3 (1.2-1.4)
Tucson, Ariz.	2	2.9 (2.8-3.0)	1.16 (1.07-1.25)	.67 (.62-.72)	.24 (.22-.26)	1.2
Coconino Co., Ariz.	1	2.5	1.32	.78	.23	1.1
Blythe, Cal.	32	3.0 (2.5-3.5)	1.32 (1.10-1.54)	.81 (.64-1.00)	.20 (.17-.23)	1.3 (1.1-1.4)
El Centro, Cal.	1	2.5	1.25	.83	.21	-
Riverside, Cal.	6	3.2 (3.0-3.4)	1.50 (1.44-1.60)	.90 (.78-1.06)	.17 (.16-.18)	1.3
Thermal, Cal.	1	2.8	1.13	.76	.22	1.1
San Diego Co., Cal.	1	2.6	1.14	.62	.23	1.3
Los Angeles Co., Cal.	1	1.6	1.00	.52	.29	1.3
Yolo Co., Cal.	1	2.7	1.30	.80	.22	1.4
La Babia, Coahuila	1	2.3	1.27	.71	.20	1.2
emarginatum						
Kerrville, Texas	3	2.6 (2.5-2.7)	1.30 (1.26-1.33)	.86 (.82-.90)	.17 (.16-.18)	1.3 (1.2-1.5)
apache						
Peña Blanca, Ariz.	1	3.7	1.10	.57	.25	1.7
Patagonia, Ariz.	1	3.5	1.16	.62	.25	1.5
Globe, Ariz.	3	3.4 (3.0-3.7)	1.16 (1.10-1.26)	.62 (.56-.73)	.26 (.24-.28)	1.6 (1.4-1.8)
Superior, Ariz.	7	3.5 (3.1-3.9)	1.16 (1.13-1.19)	.63 (.55-.68)	.25 (.24-.26)	1.6 (1.5-1.7)

40. Pseudisobrachium emarginatum new species

Holotype. — ♂, Kerrville, Texas, 10-14 July 1953 (light trap, L. J. Bottimer) [USNM, no. 65155].

Description. — Length 3.4 mm., LFW 2.6 mm. Head and thorax black, abdomen dark brown, somewhat paler on sides of basal segments; apical half of mandibles yellowish, teeth rufous;

scape dark brown, flagellum medium brown; front coxae dark brown, remaining coxae and all femora medium brown, rest of legs light brown; wings hyaline, setulae light brown, veins and stigma very light brown. Mandibles with third tooth small, fourth tooth broad. Clypeus with median carina low, weakly arched; apical margin distinctly arcuately concave (Fig. 49). First four antennal segments in a ratio of about 17:5:8:7, segment three and segment eleven each about 1.5 X as long as thick; flagellar pubescence pale, very coarse and suberect, erect setae numerous and rather long. Front of moderate breadth, WF .64 X WH, 1.33 X HE; ocelli only very slightly enlarged, DAO .17 X WF; OOL .90 X WOT; ocelli well separated, front angle of ocellar triangle less than a right angle. Eyes rather bulging, head narrowed behind the eyes, vertex rather evenly rounded off a distance above the eyes equal to about three fourths eye height. Front shining, weakly alutaceous, punctures close though shallow and rather inconspicuous. Pronotum and mesoscutum more strongly alutaceous and less shining, barely punctate; notauli weakly impressed on anterior .3 of mesoscutum; scutellar disc shining. Propodeum about 1.5 X as long as wide, disc wholly alutaceous though somewhat shining; spiracles small, elliptical, directed dorso-laterad. Mesopleurum wholly alutaceous, without strong punctures, callus large, moderately convex. Fore wing with discoidal vein represented only by an unpigmented streak.

Paratypes. — 2 ♂ ♂, same data as type [USNM, MCZ].

Variation. — The two paratypes are similar to the type in size and coloration. However, in both of them the front is more strongly alutaceous and less shining than in the type, the antennae are shorter and somewhat lighter brown, and the legs are also lighter brown.

41. Pseudisobrachium rectangulatum new species

Holotype. — ♂, Red River, Wilbarger Co., Texas, 5 July 1956 (at light, H. E. Evans and E. G. Matthews) [MCZ, No. 30291].

Description. — Length 2.8 mm.; LFW 2.2 mm. Head dark reddish-brown, thorax medium brown, abdomen light brown basally, darker beyond; mandibles, clypeus, and antennae light reddish-brown; legs wholly light brown; wings hyaline, setulae pale, veins and stigma light brown. Mandibles as in preceding species. Clypeus narrowly truncate apically, its truncate apical margin very slightly longer than third antennal segment; median carina weakly arched in profile. Antennae with first four segments in a ratio of about 17:4:7:7, segment three about 1.4 X

as long as wide, segment eleven 1.2 X as long as wide; flagellar pubescence pale, short, subappressed, erect setae short and sparse. WF .65 X WH, 1.31 X HE; ocelli slightly enlarged, DAO .20 X WF; ocelli in a broad triangle, front angle a right angle, OOL .75 X WOT. Vertex broadly rounded a distance above eye tops equal to about two-thirds X HE. Front alutaceous, moderately shining, with small, rather shallow punctures which are separated from one another by somewhat more than their own diameters. Pronotum and mesoscutum alutaceous, moderately shining, obscurely punctate; notauli distinct for anterior .3 of mesoscutum; scutellar disc weakly alutaceous, somewhat shining. Propodeum about 1.5 X as long as broad, disc alutaceous, median carina strong; spiraeles small, subcircular, directed dorso-laterad. Mesopleurum wholly altuaceous, callus not especially well defined. Fore wing with discoidal vein indicated only by an unpigmented streak which is interstitial with medial vein.

Paratypes. — TEXAS: 2 ♂♂, same data as type [CU, USNM]; 1 ♂, Victoria, 19 Aug. 1912 (J. D. Mitchell) [USNM]. NEBRASKA: 1 ♂, Sidney, 2 Aug. 1936 (H. H. Ross) [INHS]. KANSAS: 1 ♂, Grant Co., 18 Aug. 1952 (at light, H. E. Evans) [MCZ].

The following additional specimen is assigned here tentatively and is not to be regarded a paratype: NUEVO LEON: 1 ♂, Vallecillo, 2-5 June 1951 (at light, H. E. Evans) [MCZ].

Variation. — The two topotypic paratypes resemble the type closely, showing only slight differences in ocellar size. The Kansas and Nebraska specimens are somewhat darker in color and the front is broader; the Nebraska specimen is a little more noticeably punctate on the head and thorax than the type, the Kansas specimen less so. The specimen from Victoria, Texas, has shorter and slightly paler antennae but is otherwise close to the type. In the Nuevo Leon specimen the front is narrow and somewhat more shining and more distinctly punctate than in the rest of the series; the ocelli are rather large and close together; the distance from the eye tops to the vertex crest is equal to only slightly more than half the eye height; the mesopleural callus is large and somewhat convex and shining. Altogether this specimen presents a somewhat different appearance and may well represent a distinct species.

42. PSEUDISOBRACHIUM FLAVINERVIS Fouts

Pseudisobrachium flavinervis Fouts, 1928, Proc. Ent. Soc. Wash., 30: 123. [Type: ♂, Lone Star, Calif., 21 Sept. 1927 (taken from soil) (USNM, no. 41217)].

Description of type. — Length 4.0 mm.; LFW 3.2 mm. Head piceous, thorax dark reddish-brown, abdomen brown, obscurely banded with light brown; mandibles light brown, teeth rufous; scape light brown, flagellum bright, pale castaneous; front coxae brownish, legs otherwise straw-colored; wings very pale, setulae pale, stigma very light brown, veins nearly colorless. Mandibles with third tooth small, basal tooth broad, arching into inner mandibular margin (Fig. 31). Clypeus narrowly truncate apically, median carina barely arched in profile. Antennae with first four segments in a ratio of about 20:6:8:7, segment three and segment eleven each about 1.3 X as long as thick; pubescence of flagellum very pale, short, subappressed, erect setae very sparse, short, and inconspicuous. Front narrow, WF .63 X WH, 1.10 X HE; ocelli large; DAO .28 X WF; OOL .44 X WOT, latter very broad, front angle greater than a right angle. Distance from eye tops to vertex crest equal to only about half eye height; eyes rather long, not strongly bulging, rather weakly hairy (Fig. 6). Front alutaceous, moderately shining, with small but well-defined punctures which are separated from one another by slightly more than their own diameters. Pro- and mesonota alutaceous, somewhat shining, only rather obscurely punctate; notauli impressed on anterior .3 of mesoscutum; disc of scutellum shining, with a few punctures. Propodeum 1.45 X as long as broad; disc alutaceous, with a strong median carina; spiracles small, elongate, directed somewhat dorsad. Mesopleurum alutaceous, with some small punctures antero-ventrally; callus not especially strongly defined. Discoidal vein of fore wing represented by a faint, unpigmented streak which arises well below junction of basal and transverse median veins (Fig. 62).

Specimens examined. — CALIFORNIA: 1 ♂, Lone Star, Fresno Co., 21 Sept. 1927 [USNM]; 2 ♂♂, Mojave, Kern Co., 25 July 1947 (R. H. Beamer) [KU]; 2 ♂♂, Llano, Los Angeles Co., 12 July 1956 (E. I. Schlinger) [UCD]; 2 ♂♂, Nr. Hinckley, San Bernardino Co., 1 Aug. 1927 (Rehn, Pate, Rehn) [ANSP]; 1 ♂, Victorville, 15 Aug. 1927 (J. C. Bradley) [CU]; 2 ♂♂, Thermal, Riverside Co., 17 Aug. 1927 (J. C. Bradley) [CU]; 12 ♂♂, Blythe, Riverside Co., 6 July, 20 Aug. 1947 (light trap, Barr & MacSwain) [CIS]; 10 ♂♂, Holtville, Imperial Co., Sept., Oct. 1959 (light trap, C. R. Waegner) [CDAS]; 6 ♂♂, El Centro, 12 Oct. 1959 (light trap, C. R. Waegner) [CDAS]; 6 ♂♂, Imperial, 19-22 Oct. 1959 (light trap, C. R. Waegner) [CDAS]; 2 ♂♂, Calexico, 22 Oct. 1959 (C. R. Waegner); 1 ♂, Winterhaven, 3 Sept. 1959 (light trap, C. R. Waegner) [CDAS]; 15 ♂♂, Imperial Co., June 1912 (J. C. Bridwell)

[USNM]. BAJA CALIFORNIA: 2 ♂♂, San Felipe, June 1939 (Michelbacher & Ross) [CAS]; 1 ♂, Coyote Cove, Conception Bay, 29 June 1938 (Michelbacher & Ross) [CAS]. SONORA: 4 ♂♂, Hermosillo, 25 June 1959 (at light, H. E. Evans) [CU, MCZ]. ARIZONA: 1 ♂, Quartzite, Yuma Co., 20 Aug. 1927 (J. C. Bradley) [CU]; 8 ♂♂, Wellton, Yuma Co., Aug., Sept. [CU, MCZ]; Palomas, Yuma Co., 8 Aug. 1917 (J. C. Bradley) [CU]; 4 ♂♂, Gila Bend, 17 Sept. 1938 (R. H. Crandall) [UA]; 4 ♂♂, Phoenix, Aug., Sept. [CU, UA]; 2 ♂♂, Higley, 29 July (at light, J. Bequaert) [MCZ]; 7 ♂♂, Roosevelt Lake, 11 Aug. 1949 [USNM]; 135 ♂♂, 4 mi. W. Superior, June-Oct. (light trap, Gloyd, Benson) [INHS, USNM, MCZ]; 1 ♂, Florence [USNM]; 4 ♂♂, Maricopa, 17 Oct. 1927 (J. A. Kusche) [CAS]; 5 ♂♂, Tucson, June-Aug. [CAS, UA]; 5 ♂♂, Sabino Canyon, Santa Catalina Mts., July, Aug. [KVK, UA]; 1 ♂, Organ Pipe Nat. Mon., 8 May 1955 (light trap, J. Eden) [UA]; 1 ♂, Baboquivari Canyon, W. side Baboquivari Mts., 25 July 1952 [CAS]. NEVADA: 1 ♂, Las Vegas, 30 June 1940 (A. L. Melander) [MCZ]. TEXAS: 1 ♂, Valentine, 12 July 1938 (R. H. Beamer) [KU].

Variation. — The 247 males examined show a size range from 2.0 to 5.2 mm., with most specimens between 3.5 and 4.5 mm.; fore wing size ranges from 1.6 to 3.7 mm. Some specimens are lighter in color than the type, and in some specimens from southern California and from western Arizona the abdomen is distinctly paler than the head and thorax. In many specimens from these areas the clypeus is light yellowish-brown, contrasting to the much darker front; this is true, for example, of the series from Gila Bend and from Roosevelt Lake, Arizona. In the majority of specimens the front is rather strongly shining and only weakly alutaceous, but in every specimen the punctures are distinct. Variation in width of front, ocellar size, and other critical measurements is moderate (Table IX). Specimens from the extreme southern and eastern ends of the range are rather remarkably different in certain measurements. The specimen from Conception Bay, Baja California, has the vertex elevated far above the eye tops and broadly squared off; the ocelli are unusually small and the ocello-ocular line nearly as great as the width of the ocellar triangle. One of the specimens from northern Baja California shows tendencies in these directions, and thus it seems possible that the Conception Bay specimen merely represents the end of a cline. The specimen from Valentine, Texas, has a remarkably broad front and unusually strong

notauli. Despite this variation, *flavinervis* is one of the more distinctive species of the genus by virtue of the light, smooth antennae, the rather long, weakly hairy eyes, and the punctate front.

Female (assigned here tentatively). — ARIZONA: 4 mi. W. Superior, 15 June 1948 (light trap, H. K. Gloyd) [INHS].

Description of female. — Length of body 2.7 mm., LH .6 mm., LT 1.1 mm. Head dark castaneous, thorax and abdomen medium castaneous; apical half of mandibles, clypeus, and antennae light yellowish-brown; legs yellowish-brown. Mandibles with four teeth, third tooth and particularly fourth tooth very small (about as in Fig. 38). Clypeus weakly emarginate medially, median carina strong. Head 1.4 X as long as wide, sides weakly, gradually convergent to near posterior margin, where they are more abruptly, arcuately convergent. Eyes small, paler than background, no larger than a head puncture. Punctures of front absent from median strip, well separated laterally and posteriorly (mostly by slightly more than their own diameters), anteriorly decidedly crowded (separated by less than their own diameters); front alutaceous and with a weak tendency to be longitudinally striate (less evident on sides than submedially); under side of head strongly alutaceous, punctate. Pronotal disc 1.4 X as long as wide; mesonotum slender, 1.7 X as long as wide; propodeum slender, gradually tapered anteriorly, about 1.7 X as long as

TABLE IX

Species and locality	No.	LFW	WF/HE	OOL/WOT	DAO/WF	Ant. 11 L/W
flavinervis						
Lone Star, Cal.	1	3.2	1.10	.44	.28	1.3
Mojave, Cal.	2	3.1 (3.0-3.2)	1.18 (1.16-1.20)	.45	.26 (.24-.28)	1.2
Llano, Cal.	2	2.8	1.13	.47 (.44-.50)	.25 (.24-.26)	1.3
Hinckley, Cal.	2	3.0 (2.9-3.2)	1.13	.39 (.38-.40)	.25	1.3
Victorville, Cal.	1	3.1	1.18	.49	.23	1.3
Thermal, Cal.	2	2.7 (2.5-2.9)	1.10 (1.08-1.12)	.58 (.53-.64)	.22 (.20-.24)	1.3
Blythe, Cal.	12	2.4 (2.0-2.8)	1.09 (1.05-1.13)	.55 (.50-.60)	.24 (.22-.26)	1.2 (1.1-1.3)
El Centro and vic.	39	2.9 (2.2-3.3)	1.07 (.97-1.18)	.47 (.38-.56)	.25 (.23-.30)	1.3 (1.2-1.5)
Winterhaven, Cal.	1	2.9	1.12	.63	.23	1.3
San Felipe, Baja Cal.	2	2.9 (2.6-3.2)	1.10 (1.00-1.20)	.57 (.46-.68)	.25 (.23-.27)	1.3 (1.2-1.4)
Conception Bay, B. C.	1	2.5	1.29	.89	.17	1.3
Hermosillo, Sonora	4	2.4 (2.0-2.7)	1.12 (1.05-1.17)	.52 (.46-.55)	.23 (.22-.25)	1.1
Yuma Co., Ariz.	11	2.6 (2.1-3.0)	1.12 (1.04-1.21)	.51 (.45-.67)	.24 (.21-.25)	1.3 (1.1-1.4)
Maricopa Co., Ariz.	10	2.7 (2.3-3.2)	1.10 (.98-1.23)	.46 (.37-.59)	.24 (.22-.25)	1.3 (1.1-1.4)
Gila Co., Ariz.	7	2.5 (2.4-2.6)	1.18 (1.12-1.24)	.58 (.54-.63)	.23 (.22-.24)	1.3 (1.2-1.4)
Pinal Co., Ariz.	135	2.5 (1.6-3.1)	1.13 (1.00-1.24)	.57 (.48-.62)	.23 (.20-.26)	1.3 (1.1-1.4)
Pima Co., Ariz.	12	2.7 (2.3-3.2)	1.20 (1.11-1.27)	.59 (.46-.72)	.22 (.20-.26)	1.2 (1.1-1.3)
Las Vegas, Nev.	1	3.0	1.07	.40	.27	1.2
Valentine, Texas	1	2.5	1.52	.78	.19	1.2
rectangulatum						
Sidney, Nebr.	1	2.9	1.40	.72	.22	1.2
Grant Co., Kansas	1	2.5	1.42	.82	.19	1.2
Wilbarger Co., Tex.	3	2.1 (2.0-2.2)	1.31 (1.29-1.32)	.77 (.75-.79)	.21 (.19-.22)	1.2
Victoria, Tex.	1	2.4	1.30	.69	.20	1.0
Vallecillo, N. Leon	1	2.5	1.08	.60	.24	1.1
macrops						
Port Isabel, Tex.	2	2.9	.98 (.94-1.02)	.29 (.28-.30)	.36 (.35-.37)	1.2
San Juan, Tex.	1	2.8	1.05	.33	.36	1.2

wide. Pronotal disc strongly shining, with sparse, rather weak punctures; mesonotum wholly although weak alutaceous; propodeum also wholly alutaceous, although very weakly so medially and strongly shining here, sides obscurely punctate. Mesopleurum alutaceous, obscurely punctate. Hairs of body and legs short, pale.

Remarks. — The female described above was taken in a light trap at the same time and place as a long series of males (also some males of *obscurum*). I feel fairly certain that it properly belongs with *flavinervis,* less certain as to how to clearly distinguish it from other females of this complex. The distribution of this species is shown on Map 3.

43. Pseudisobrachium macrops new species

Holotype. — ♂, Port Isabel, Cameron Co., Texas, 23-27 June 1956 (at light, H. E. Evans and E. G. Matthews) [MCZ, No. 30292].

Description. — Length 4.4 mm.; LFW 2.9 mm. Head black, thorax dark reddish-brown, abdomen bright rufo-castaneous; mandibles light brown, teeth rufous; scape light brown; flagellum dull rufo-castaneous; legs, including all coxae, pale straw-colored; wings hyaline, veins and stigma brown. Mandibles with third tooth small, fourth broad and arching into inner mandibular margin. Clypeus truncate apically, median carina weakly arched in profile. First four antennal segments in ratio of about 20:5:9:9, segment three 1.5 X as long as thick, segment eleven 1.2 X as long as thick; pubescence of flagellum pale, rather coarse, semi-erect, erect setae fairly numerous, toward the base some of them nearly half as long as thickness of flagellum. WF .56 X WH, 0.94 X HE; ocelli remarkably large and convex, DAO .37 X WF; OOL .30 X WOT, actually less than diameter of an ocellus; front angle of ocellar triangle greater than a right angle. Vertex elevated above eye tops a distance equal to about half HE; eyes distinctly more hairy than in *flavinervis.* Front strongly alutaceous, rather weakly shining, punctures shallow and less conspicuous than in *flavinervis,* separated from one another by from 1 to 1.5 X their own diameters. Mesoscutum somewhat more strongly shining and more distinctly punctate than pronotum; notauli strong on anterior .4 of mesoscutum; disc of scutellum strongly shining. Propodeum 1.35 X as long as broad, disc weakly alutaceous, shining, median carina strong; spiracles elliptical, directed somewhat dorsad. Mesopleural callus

elongate, moderately convex, shining, somewhat alutaceous; anterior and ventral portions of mesopleurum more strongly alutaceous and with some punctures. Fore wing with discoidal vein only very weakly indicated, arising somewhat below junction of basal and transverse median veins.

Paratypes. — TEXAS: 1 ♂, same data as type [CU]; 1 ♂, San Juan, Hidalgo Co., 28 June 1938 (L. W. Hepner) [KU].

Variation. — In both paratypes the front is relatively a little wider than in the type. In the San Juan specimen the mesoscutum is not noticeably more shining or punctate than the pronotum and the punctures of the front are smaller.

Anomalous Males

Under this heading are considered three species known from males only, none of which fit well into any of the six species-groups recognized. The first two of these species possess five-toothed mandibles and genitalia of unusual form as well as certain unique features; I would expect these two species to have evolved from a primitive stock independently of each other and of other known species. The third species, *superbum*, has only three mandibular teeth and the median carina of the propodeum replaced by some weak, irregular longitudinal rugae; the genitalia of this species are of the conventional *Pseudisobrachium* type. I would regard this as one of the more highly evolved members of the genus.

44. Pseudisobrachium petiolatum new species

Holotype. — ♂, Tabernilla, Canal Zone, 27 April 1907 (August Busck) [USNM, no. 65385].

Description. — Length 3 mm.; LFW 2 mm. Head piceous; thorax and abdomen castaneous, petiole somewhat infuscated; legs light brown; antennae medium brown; fore wing very faintly clouded, veins and stigma brown. Mandibles with five sharp teeth in an oblique series (Fig. 7). Clypeus broadly rounded apically, its median carina sharp except at base and apex. Antennae very long, flagellum clothed with semirecumbent pubescence of moderate length plus a few longer, suberect setae; first four antennal segments in a ratio of about 4:1:4:3; antennal segment eleven about twice as long as thick. WF .56 X WH, about equal to HE; OOL 1.10 X WOT, ocelli of moderate size, in a compact triangle, anterior ocellus situated well above eye

tops. Front strongly alutaceous but somewhat shining, the punctures shallow and relatively inconspicuous. Occipital carina complete. Pronotum long, collar subfoveolate. Mesoscutum alutaceous, weakly shining; notauli strong on anterior .7, absent behind; scutellum wholly alutaceous, anterior groove and lateral foveae rather shallow. Propodeum 1.6 X as long as wide, median carina weak, extending for about half its length; lateral carinae strong, the groove above them subfoveolate; spiracles very large, subcircular, directed dorsad. Mesopleurum wholly alutaceous, the front half roughened by large punctures. Fore wing with discoidal vein strong, arising well down on transverse median vein; basal vein erect, reaching subcosta far basad of stigma (Fig. 52). First abdominal segment with a rather long petiole (Fig. 68). Genitalia with the parameres deeply divided into two lobes; digitus and cuspis complex, the latter somewhat disc-shaped, with marginal setae; basis volsellaris weakly developed and without any evidence of a vannus; aedoeagus simple, deeply divided apically, one half somewhat angled (probably an artifact) (Fig. 65).

Remarks. — This unusual species has a clypeus and genitalia unlike those of any other species, but more like those of other genera of Pristocerini. The complete occipital carina suggests *Propristocera*, and the petiolate abdomen is much like that of *P. laevigata*. However, the hairy eyes, type of antennal pubescence, and many features of the genitalia suggest that this species properly belongs in *Pseudisobrachium*.

45. Pseudisobrachium anomalum new species

Holotype. — ♂, Arlington, Va., July 19, 1952 (K. V. Krombein) [USNM, no. 65386].

Description. — Length 3.5 mm.; LFW 2.2 mm. Head black; thorax and abdomen dark brownish-fuscous; legs pale castaneous, except front coxae infuscated; mandibles yellowish, infuscated basally, teeth rufous; antennae yellowish-brown, somewhat darker beyond basal four segments; wings hyaline, stigma brown, veins very light brown. Mandibles with five strong teeth in an oblique series (Fig. 8). Median lobe of clypeus weakly emarginate apically. Antennae rather short, flagellum with rather coarse, semirecumbent pubescence and a few erect setae which are nearly half as long as width of flagellum; first four antennal segments in a ratio of about 15:5:7:6; segment eleven about 1.3 X as long as thick. WF .66 X WH, 1.35 X HE; OOL 1.3 X

WOT, ocelli small, in a compact triangle, the front ocellus well above level of eye tops. Front rather strongly shining, but slightly duller and more noticeably alutaceous anteriorly and also behind ocellar triangle; punctures strong, especially so above the eyes, separated from one another by about their own diameters. Pronotum short, rather roughly punctate. Mesoscutum strongly shining, especially between notauli, where it is not at all alutaceous; mesoscutal punctures strong, very sparse medially, more crowded laterally; notauli impressed on anterior .9 of mesoscutum. Scutellum shining, punctate, the basal groove deep, the lateral foveae shallow. Propodeum 1.3 X as long as broad; median carina distinct, dorsal surface otherwise completely covered with a reticulum of rather strong ridges; spiracles small, elliptical, directed laterad. Mesopleural callus shining, non-alutaceous, the remainder of the mesopleura more or less alutaceous and pitted. Fore wing with transverse median vein suberect, weakly arched; discoidal vein absent (Fig. 54). Abdomen sessile, rather short and broad. Aedoeagus strongly compressed, of complex structure; inner arm of paramere very slender, digitiform; vannus strong, bearing the radiating ridges characteristic of all species of *Pseudisobrachium* except *petiolatum* (Figs. 64, 67).

Paratypes. — NEW JERSEY: 1 ♂, Moorestown, 23 July 1939 (H. & M. Townes) [HKT]. FLORIDA: 1 ♂, Okaloosa Co., 31 July 1955 (F. W. Mead) [FSPB]. ILLINOIS: 1 ♂, Alto Pass 13 Aug. 1891 (C. A. Hart) [INHS].

Variation. — The paratypes are all slightly smaller than the type (LFW 2.0-2.1 mm.). In the New Jersey specimen the head and thorax are dark castaneous, the abdomen somewhat lighter; in the Illinois specimen the entire body is castaneous; in the Florida specimen the body is wholly nearly black and the femora and coxae somewhat infuscated. The antennae of the Florida specimen are bright yellowish-brown with a tinge of rufous. In the New Jersey and Florida specimens the antennae are shorter than in the type, segment eleven measuring 1.1-1.2 X as long as thick. WF measures .67-.68 X WH, 1.39-1.45 X HE. In the Florida specimen the ocellar triangle is rather wide, OOL only 1.1 X WOT. In the New Jersey specimen the posterior half of the mesoscutum is weakly alutaceous, even between the notauli, as are the mesopleural calli; this specimen is lacking all but the basal three segments of the gaster. In the New Jersey and Illinois specimens the pronotum has a shallow transverse groove before the posterior margin.

46. Pseudisobrachium superbum new species

Holotype. — ♂, Cano Saddle, Gatun Lake, Panama, 17 May 1923 (R. C. Shannon) [USNM, no. 65387].

Description. — Length 5.2 mm.; LFW 3.8 mm. Head and thorax shining black, propodeum piceous, abdomen piceous except suffused with pale reddish-brown laterobasally; mandibles yellow, teeth rufous; scape yellow, flagellum light reddish-brown; legs entirely straw-yellow, tarsi slightly darker than the rest; wings subhyaline, veins and stigma brown. Mandibles slender, with only three apical teeth, the basal tooth rounded (Fig. 32). Clypeus unusually large, broadly truncate apically. Antennae of moderate length; first four segments in a ratio of about 15:3:11:8, segment eleven twice as long as thick; flagellar pubescence pale, appressed, erect setae numerous, short, some of them extremely thin. WF .61 X WH, 1.15 X HE; ocelli of moderate size, DAO .16 X WF; ocelli in a compact triangle, the front angle less than a right angle; OOL 1.18 X WOT. Vertex narrowly rounded, extending above eye tops a distance equal to slightly more than half the eye height; occipital carina complete. Front strongly shining, non-alutaceous, with small but sharply defined and deep punctures; these punctures are close together on the lower front, but on the vertex they are separated by about three times their own diameters. Pronotal disc unusually flat, unusually wide in front, shining and with strong, sparse punctures. Mesoscutum strongly shining, non-alutaceous, with only a few punctures, these mostly on the sides; notauli very strong, complete. Disc of scutellum strongly shining medially, laterally with some minute punctures. Propodeum about 1.3 X as long as broad, its entire dorsal surface crossed by close transverse ridges, medio-basally with several irregular longitudinal ridges, but without a well-defined single median carina; spiracles nearly circular, directed dorsad. Mesopleurum shining, non-alutaceous, with large, widely separated punctures except on the callus, which is smooth. Genitalia differing from the usual form of the genus only in that the dorsal branch of the paramere is rather suddenly contracted subapically (Fig. 66). Discoidal vein of fore wing weakly pigmented for a short distance, interstitial with median vein; stigma unusually large (Fig. 51).

Paratype. — 1 ♂, Pacora, Canal Zone, May 13, 1953 (F. S. Blanton) [USNM].

Variation. — The single paratype is slightly larger than the

type, measuring 6 mm. in length, fore wing 4 mm. The propodeum is darker than in the type, nearly black, while the abdomen is uniformly dark reddish-brown. There are no other noticeable differences, and head measurements are virtually the same as in the type.

Unassigned Females

The remaining five species are known from females only. In all probability some of these names will fall in synonymy when the sexes have been properly associated.

47. Pseudisobrachium gigas new species

Holotype. — ♀, Barro Colorado Island, Canal Zone, Sept. 1941 (J. Zetek) [USNM, no. 65156].

Description. — Length 6.5 mm., LH 1.4 mm., LT 2.4 mm. Head and thorax dark reddish-brown, almost piceous, abdomen dark reddish brown, blotched with paler brown, especially laterally and apically; mandibles light castaneous, teeth rufous; antennae bright castaneous, segments 3-12 with an apical annulus of dark brown; legs wholly bright castaneous; sting-palps yellowish. Mandibles with four strong teeth (Fig. 33). Clypeus with a strong median ridge which is continued past the truncate apical margin as a sharp median tooth. Head 1.15 X as long as wide; sides nearly parallel until just before posterior margin, where they are arcuately contracted; vertex straight across, occipital carina obsolete dorsally. Eye in form of a single distinct lens which is white and strongly contrasting to the brown head; eye larger than one of punctures of head. Head punctures strong, slightly longer than wide, rather evenly spaced, space between them, on the average, about 1-1.5 X greatest width of a puncture; space between punctures flat, polished, non-alutaceous and with no sculpturing whatever. Pronotum relatively flat, sides of disc rounded; disc 1.15 X as long as wide; pro- and mesonota shining, non-alutaceous, devoid of punctures medially but with sparse punctures laterally; mesopleura shining and with evenly spaced punctures. Propodeum with disc strongly shining, non-alutaceous, with a few punctures on the extreme sides, sides subcarinate; spiracles circular, directed dorso-laterad.

Paratype. — ♀, Barro Colorado Island, Canal Zone, 29-31 March 1924 (J. C. Bradley) [CU].

Variation. — The paratype is remarkably similar to the type in size, color, and all structural details. The measurements presented for the type apply equally well to this specimen.

Remarks. — The male of this species must be a remarkably large *Pseudisobrachium* indeed. It will doubtless be found to have five-toothed mandibles and may well run to the *crassum* group in the keys presented here.

48. PSEUDISOBRACHIUM ZETEKI new species

Holotype. — ♀, Barro Colorado Island, Canal Zone, July 1941 (J. Zetek) [USNM, no. 65157].

Description. — Length 3.6 mm., LH .75 mm., LT 1.4 mm. Head and thorax dark reddish-brown, abdomen yellowish-brown, each of basal five tergites with darker bands basally and apically; mandibles yellowish-brown, suffused with rufous basally and apically; antennae castaneous, flagellum fading to straw-yellow apically; legs bright yellowish-brown except front coxae brownish. Mandibles with four strong teeth, third tooth actually slightly smaller than basal tooth (Fig. 34). Clypeus with median ridge very strong, though not continued past the apical margin as a tooth. Head 1.3 X as long as wide; sides nearly parallel until just before posterior margin, where they are arcuately contracted; vertex straight across, occipital carina prominent on crest of vertex. Eye a single large amber-colored facet which contrasts moderately with the brown head. Punctures of head strong, anteriorly separated by no more than their own diameters, posteriorly more widely spaced, largely absent from center of upper front; surface between punctures very strongly polished, non-alutaceous. Pronotum less flattened than in *gigas,* rather slender; disc 1.28 X as long as wide; mesonotum 1.6 X as long as wide; propodeum 1.6 X as long as wide. Thoracic dorsum wholly strongly shining, non-alutaceous; punctures small, restricted to sides of nota and propodeal disc. Mesopleurum with sparse punctures, strongly shining except somewhat alutaceous below; sides of propodeum also somewhat alutaceous.

Remarks. — The male of this species may be *clypeatum* or, less probably, *rettenmeyeri* or *cooperi.* Another possibility is *superbum,* which also has a complete occipital carina, but only three-toothed mandibles.

49. PSEUDISOBRACHIUM MANNI new species

Holotype. — ♀, Mixico,[7] Guatemala, 24 May (W. M. Mann) [USNM, no. 65158].

[7] I have been unable to find this locality on maps available to me. There are two villages called Mixco, one in the central highlands in the state of Guatemala, one in the eastern lowlands in the state of Izabal.

Description. — Length 4.0 mm., LH .9 mm., LT 1.5 mm. Head black, thorax piceous, grading into black dorsally, abdomen ferrugino-castaneous; mandibles, clypeus, and scape bright castaneous, flagellum dull castaneous, apical segment yellowish; front coxae piceous, legs otherwise bright straw-yellow. Mandibles relatively slender, two apical teeth strong, third tooth slightly smaller and somewhat recessed, basal tooth small, much recessed (Fig. 35). Clypeus broadly truncate apically, median elevation strong but somewhat round-topped, smoothly declivous well before apical margin. Head 1.25 X as long as wide; sides nearly parallel, behind arcuately convergent to vertex, which is straight; occipital carina obsolescent dorsally. Eye a single large facet which is pale and strongly contrasting to the black head. Front with strong punctures except along midline; punctures anteriorly separated by less than their own diameters, laterally (around eyes) distinctly striatopunctate; punctures posteriorly slightly smaller, separated from one another by about their own diameters; surface of front between punctures strongly polished, nonalutaceous or very nearly so; under surface of head with strong, rather evenly spaced punctures. Pronotal disc 1.2 X as long as wide; mesonotum 1.6 X as long as wide; propodeum short, only 1.3 X as long as wide. Thoracic dorsum strongly shining, pronotum and propodeum weakly alutaceous posteriorly; pronotum with numerous punctures, well distributed but absent from midline; mesonotum and propodeum with punctures absent from broad median area. Mesopleurum alutaceous and with large, almost contiguous punctures. Sides of propodeum minutely alutaceo-striolate; propodeal spiracles subcircular, opening laterally.

Remarks. — The male of this striking form may possibly be a member of the *crassum* group such as *perpunctatum* or *dalmati*. On the other hand, the mandibles are more like those of supposed females of the *occidentale* and *obscurum* groups. However, no members of either of these groups are currently known from Guatemala.

50. Pseudisobrachium paucipunctatum Fouts

Pseudisobrachium paucipunctata Fouts, 1928, Proc. Ent. Soc. Wash., 30: 122. [Type: ♀, Salt Lake, Utah, 13 June (USNM, no. 62549)].

Description of type. — Length 2.9 mm., LH .6 mm., LT 1.1 mm. Head and thorax castaneous, abdomen pale yellowish-brown; mandibles, clypeus, and scape light yellowish-brown, flagellum straw-colored; legs wholly straw-colored. Mandibles as figured

for *obscurum* (Fig. 36). Clypeus somewhat emarginate apically, median carina strong. Head 1.36 X as long as wide, sides slightly but perceptibly narrowed to just before posterior margin, where they are arcuately contracted to a broad, straight vertex; occipital carina obsolete dorsally. Eyes barely contrasting to front. Front moderately alutaceous anteriorly, more weakly so behind; punctures small, somewhat elongate, separated by about their own diameters except more sparse medially and posteriorly; under side of head alutaceous, weakly punctate. Pronotal disc 1.6 X as long as wide; mesonotum 1.7 X as long as wide; propodeum 1.6 X as long as wide. Pronotum shining, weakly alutaceous, punctures small and well separated, absent from median area; mesonotum shining, weakly alutaceous, with some weak lateral punctures. Propodeum wholly weakly alutaceous, somewhat shining, weakly punctate laterally; spiracles circular, directed dorso-laterad. Mesopleurum alutaceous, weakly punctate. Body and legs clothed with short, pale setae.

Other females. — CALIFORNIA: 1, Yucaipa, 11 May 1938 (peach orchard, Christenson) [USNM].

51. PSEUDISOBRACHIUM COSTARICANUM new species

Holotype. — ♀, Hamburg Farm, Santa Clara Prov., Costa Rica, 30 Sept. 1926, F. Nevermann) [USNM, no. 65388].

Description. — Length 3.4 mm., LH .82 mm., LT 1.4 mm. Head and thorax piceous, abdomen bright rufo-castaneous except segments more yellowish apically and laterally; mandibles yellowish, teeth rufous; scape bright yellowish, flagellum dull, pale yellowish-brown; front coxae reddish-brown, legs otherwise bright yellowish-brown. Mandibles slender, with three teeth, basal tooth large and projecting (Fig. 42). Clypeus with apical margin strongly emarginate, median ridge very strong and projecting as a small tooth over apical margin. Head 1.22 X as long as wide, sides slightly but perceptibly narrowed to just before posterior margin, where they are arcuately contracted to a broad, straight vertex; occipital carina obsolete dorsally. Eye consisting of a large, white facet which contrasts strongly to head color. Front strongly shining, non-alutaceous, with elongate punctures which are separated on posterior part by less than their own diameters (except more sparse medially), on anterior part separated by much less than their own diameters, on sides somewhat striato-punctate; under side of head shining, with punctures rather evenly spaced. Pronotal disc 1.4 X as long as

wide; mesonotum 1.5 X as long as wide; propodeum 1.4 X as long as wide. Discs of pro- and mesonota strongly polished, non-alutaceous over most of central area, with weak punctures which are largely absent from central area; disc of propodeum strongly polished, obscurely alutaceous behind. Sides of mesopleurum strongly alutaceous, weakly punctate. Body hairs pale, moderately long, those on the coxae and femora shorter than those on body and on apical parts of legs.

Paratype. — 1 ♀, same data as type [USNM].

Variation. — The paratype is somewhat smaller, length of body 3.1 mm., of head .7 mm., of thorax 1.2 mm. The head is a bit more slender, measuring 1.28 X as long as broad; the punctures are somewhat less crowded than in the type, especially anteriorly. In all other respects the paratype resembles the type very closely.

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PLATES

PLATE 1

Heads of male *Pseudisobrachium,* anterior view with antennae omitted (not drawn to same scale).

Fig. 1. *P. ashmeadi* n. sp., paratype
Fig. 2. *P. persimile* n. sp., paratype
Fig. 3. *P. hurdi* n. sp., paratype
Fig. 4. *P. minutissimum* n. sp., holotype
Fig. 5. *P. rufiventre* (Ashmead), allotype
Fig. 6. *P. flavinervis* Fouts.

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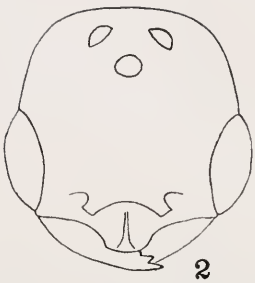
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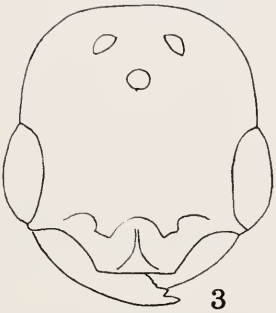
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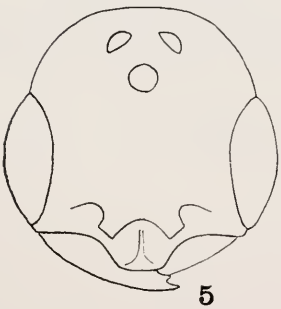
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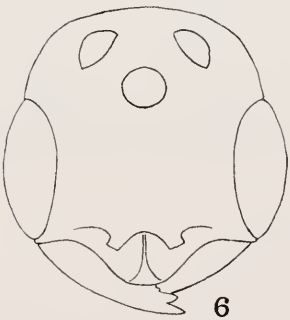
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PLATE 2

Apex of mandibles of male *Pseudisobrachium* (not drawn to same scale).

Fig. 7. *P. petiolatum* n. sp., holotype
Fig. 8. *P. anomalum* n. sp., holotype
Fig. 9. *P. micheneri* n. sp., holotype
Fig. 10. *P. blomi* n. sp., holotype
Fig. 11. *P. clypeatum* n. sp., holotype
Fig. 12. *P. cooperi* n. sp., holotype
Fig. 13. *P. crassum* n. sp., paratype
Fig. 14. *P. occidentale* n. sp., paratype
Fig. 15. *P. brunneum* n. sp., paratype
Fig. 16. *P. obscurum* n. sp., holotype
Fig. 17. *P. pallidum* n. sp., holotype
Fig. 18. *P. michoacanum* n. sp., holotype
Fig. 19. *P. aztecum* n. sp., holotype
Fig. 20. *P. arenarium* n. sp., holotype
Fig. 21. *P. prolongatum* (Provancher), plesiotype, Ottawa, Ont.
Fig. 22. *P. prolongatum* (Provancher), specimen from Mt. Pisgah, N.C.
Fig. 23. *P. ashmeadi* n. sp., paratype
Fig. 24. *P. minimum* n. sp., holotype
Fig. 25. *P. navajo* n. sp., holotype
Fig. 26. *P. minutissimum* n. sp., holotype

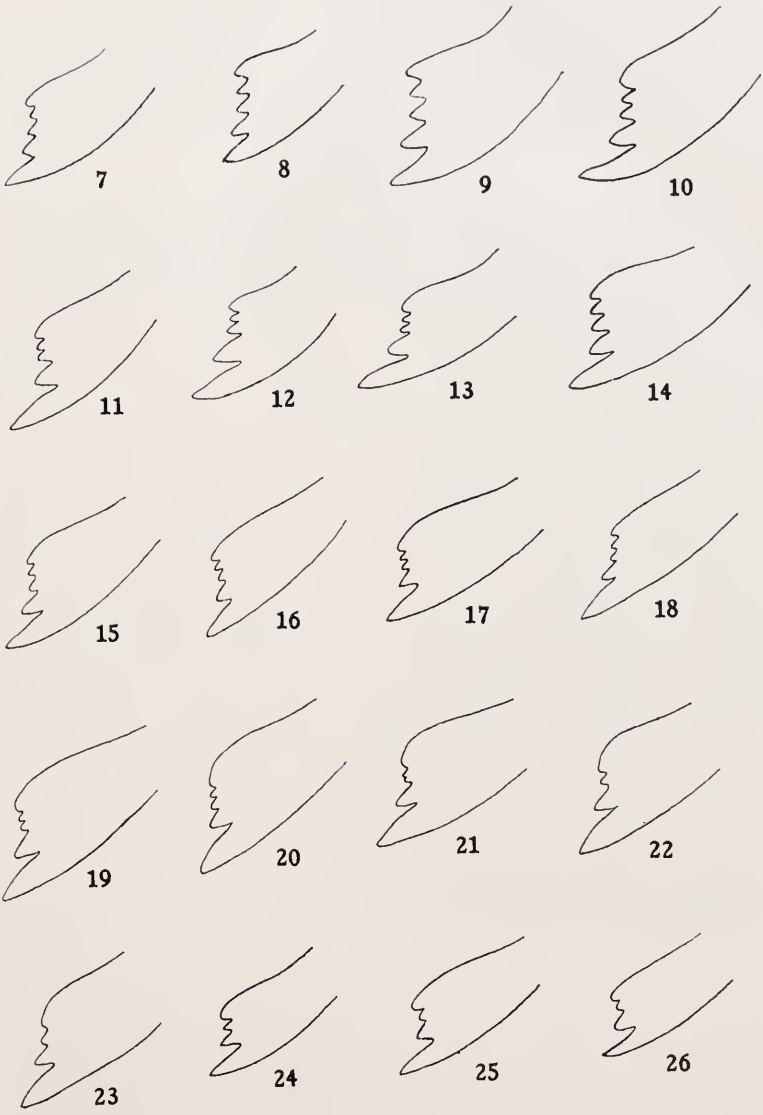
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PLATE 3

Figs. 27-32, apex of mandibles of male *Pseudisobrachium*. Figs. 33-42, apex of mandibles of female *Pseudisobrachium*. Figs. 43-50, clypeus of male *Pseudisobrachium*. Figures not drawn to same scale.

Fig. 27. *P. krombeini* n. sp., holotype ♂
Fig. 28. *P. flavicornis* (Kieffer), ♂
Fig. 29. *P. foutsi* n. sp., holotype ♂
Fig. 30. *P. foutsi* n. sp., ♂ from Willcox, Arizona
Fig. 31. *P. flavinervis* Fouts, ♂
Fig. 32. *P. superbum* n. sp., holotype ♂
Fig. 33. *P. gigas* n. sp., holotype ♀
Fig. 34. *P. zeteki* n. sp., holotype ♀
Fig. 35. *P. manni* n. sp., holotype ♀
Fig. 36. *P. obscurum* n. sp. (?), ♀
Fig. 37. *P. carbonarium* (Ashmead) (?), ♀
Fig. 38. *P. ashmeadi* n. sp. (?), ♀
Fig. 39. *P. prolongatum* (Provancher), ♀ plesiallotype, Toronto, Ont
Fig. 40. *P. rufiventre* (Ashmead), ♀
Fig. 41. *P. flaviventre* (Kieffer) (?), ♀
Fig. 42. *P. costaricanum* n. sp., holotype ♀
Fig. 43. *P. clypeatum* n. sp., holotype ♂
Fig. 44. *P. rettenmeyeri* n. sp., holotype ♂
Fig. 45. *P. foutsi* n. sp., paratype ♂
Fig. 46. *P. apache* n. sp., holotype ♂
Fig. 47. *P. cooperi* n. sp., holotype ♂
Fig. 48. *P. texanum* n. sp., holotype ♂
Fig. 49. *P. emarginatum* n. sp., holotype ♂
Fig. 50. *P. krombeini* n. sp., holotype ♂

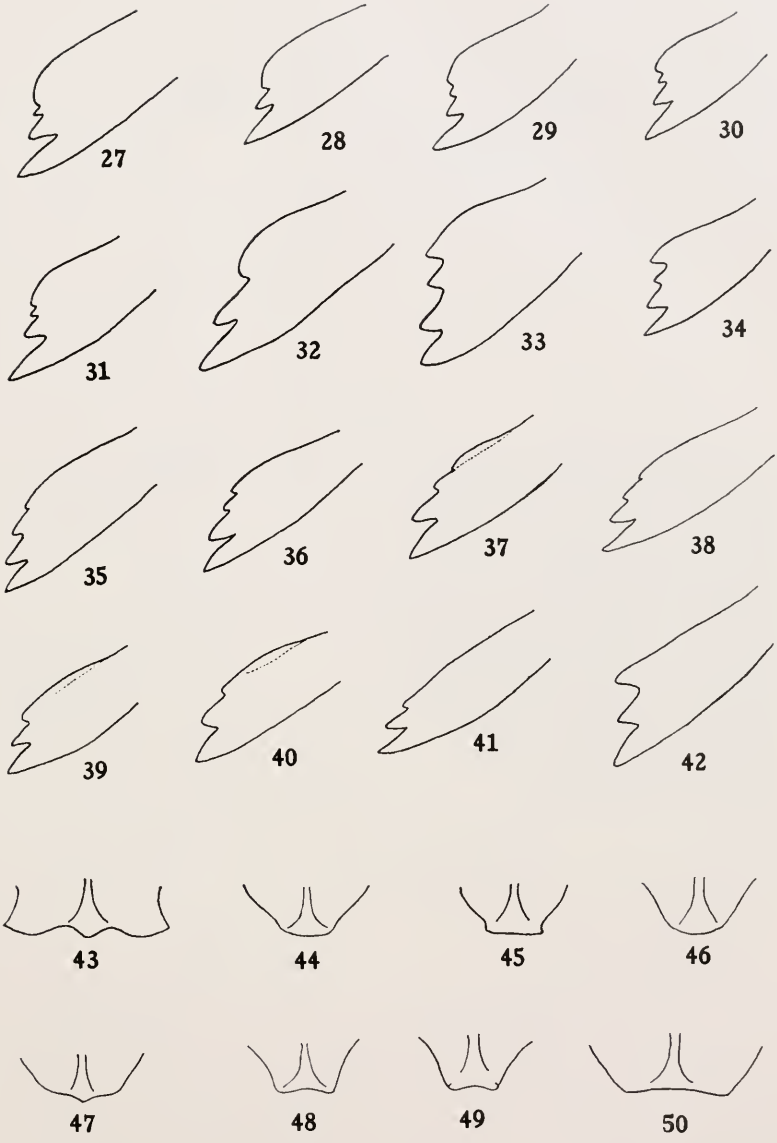
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PLATE 4

Fore wings of male *Pseudisobrachium*, not drawn to same scale.

Fig. 51. *P. superbum* n. sp., holotype
Fig. 52. *P. petiolatum* n. sp., holotype
Fig. 53. *P. texanum* n. sp., paratype
Fig. 54. *P. anomalum* n. sp., holotype
Fig. 55. *P. occidentale* n. sp., paratype
Fig. 56. *P. castaneum* n. sp., paratype
Fig. 57. *P. prolongatum* (Provancher)
Fig. 58. *P. ashmeadi* n. sp., paratype
Fig. 59. *P. comanche* n. sp., paratype
Fig. 60. *P. flaviventre* (Kieffer)
Fig. 61. *P. foutsi* n. sp., paratype
Fig. 62. *P. flavinervis* Fouts

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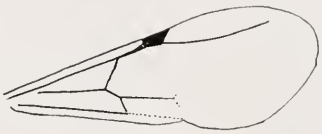

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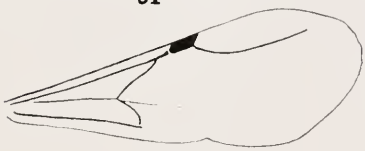

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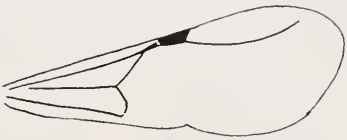

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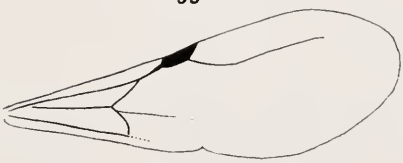

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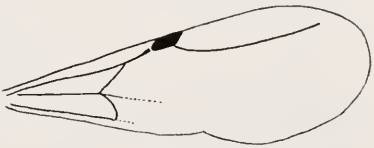

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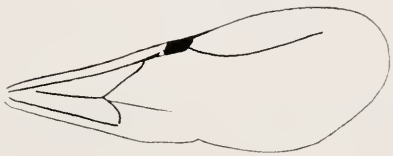

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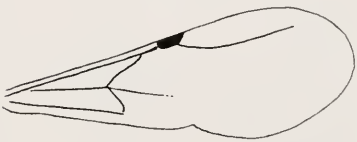

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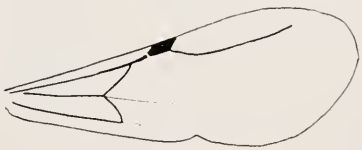

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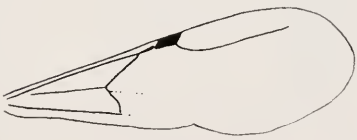

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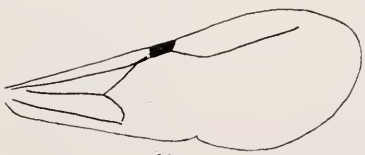

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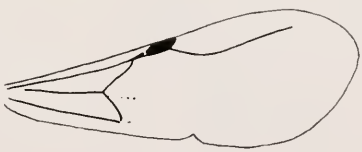

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PLATE 5

Abdominal structures of male *Pseudisobrachium*, not drawn to same scale.

Fig. 63. Genitalia of *P. ashmeadi* n. sp., paratype, ventral aspect on left side, dorsal on right

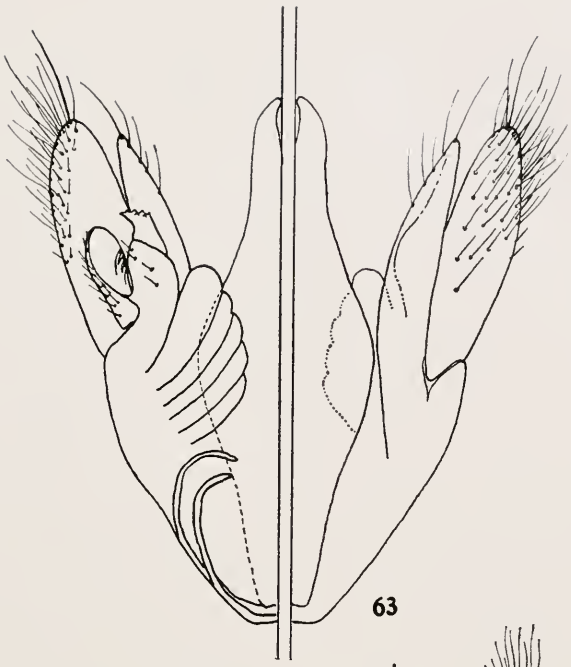
Fig. 64. Paramere and volsella of *P. anomalum* n. sp., holotype, dorso-mesal aspect

Fig. 65. Genitalia of *P. petiolatum* n. sp., holotype, ventral aspect, right paramere and volsella omitted

Fig. 66. Inner arm of paramere of *P. superbum* n. sp., holotype

Fig. 67. Aedoeagus and paramere of *P. anomalum* n. sp., holotype, lateral aspect

Fig. 68. Base of abdomen of *P. petiolatum* n. sp., holotype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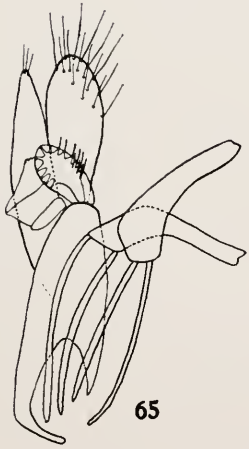
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Bulletin of the Museum of Comparative Zoology
AT HARVARD COLLEGE
Vol. 126, No. 3

THE CARABID BEETLES OF NEW GUINEA PART I. CICINDELINAE, CARABINAE, HARPALINAE THROUGH PTEROSTICHINI

By P. J. Darlington, Jr.

With Four Plates

CAMBRIDGE, MASS., U.S.A.
PRINTED FOR THE MUSEUM
May 3, 1962

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PRINTED FOR THE MUSEUM

No. 3 *The Carabid Beetles of New Guinea*[1]
Part I. Cicindelinae, Carabinae, Harpalinae through Pterostichini

By P. J. Darlington, Jr.

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[1] Work aided by two fellowships of the John Simon Guggenheim Memorial Foundation, 1947 and 1956; see pages 327 and 328.

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INTRODUCTION

Purpose; sources of material. This is, in taxonomic sequence, the first part of a survey of the beetles of the family Carabidae of the island of New Guinea. However, it is not the first-published part of the survey. Part II, covering the Agonini (Anchomenini), has already appeared.[2] Reasons for publishing Part II before Part I are given on page 90 of Part II. The present part covers the subfamilies and tribes of Carabidae that precede the Agonini in the Junk-Schenkling *Coleopterorum Catalogus* (Pars 86 by Horn, 1926, and Pars 92, 97, 98, 104, and 112 by Csiki 1927-1933). Part III will cover the groups that follow the Agonini. These three parts, arranged as numbered, will then cover the whole family Carabidae in the order of the *Catalogus*. A fourth part will be necessary for statistics and discussion of the New Guinean carabid fauna as a whole and of its geographical relationships and origins, and to describe additional species that accumulate during the course of the work.

I have already listed (Part II, pp. 90-91) the principal sources of material used in this survey. Three notable additional lots have been received since then. One is a collection of more than 1,000 specimens of mostly small Carabidae collected in New Guinea by the Hungarian entomologist Dr. L. Biró from 1896-1902, loaned me for study by the Hungarian National Museum, Budapest, through the kindness of Dr. Z. Kaszab. Another is the collection made in New Guinea and elsewhere by Dr. E. O. Wilson in 1954-1955. This collection is not large (Dr. Wilson was concentrating on ants) but it includes a number of interesting species from new localities. The third is a lot of about 1400 specimens recently collected in New Guinea by Dr. J. L. Gressitt and others (W. W. Brandt, E. J. Ford, Jr., and T. C. Maa) for the Bishop Museum. The Bishop Museum is now accumulating large collections of insects from New Guinea as well as from other parts of the Pacific-Australian area, and more Carabidae will certainly be forthcoming, but not in time to be included in this part of my work. They will have to be dealt with in Parts III and IV. Besides the principal collections described here and in Part II, I have received specimens or assistance from many other museums and individuals, who will be listed in Part IV.

[2] *Bulletin of the Museum of Comparative Zoology*, Vol. 107, No. 3, pp. 87-252, with 4 plates, August 1952.

Disposition of material; abbreviations. Unless otherwise noted, specimens collected by myself are in the Museum of Comparative Zoology, here usually abbreviated as M.C.Z.; by Miss Cheesman, in the British Mus(eum); by Toxopeus, returned to the Leiden Mus(eum), for distribution; and by Biró, in the Hungarian National Mus(eum). The United States National Museum (Washington) is abbreviated as U.S.N.M.; the American Museum of Natural History (New York), as A.M.N.H. Other abbreviations are, I think, immediately intelligible.

Previous work on Carabidae of New Guinea and neighboring areas. Very little has been published on the New Guinean carabid fauna as such, although a number of species have been described or recorded from the island casually or in revisions not primarily concerned with New Guinea. However two references are worth giving because they mark efforts of students of adjacent carabid faunas to extend their work to New Guinea. One is a two-part contribution by an Australian, Sloane, on "New *Carabidae* from German New Guinea and its Dependencies" and "Further *Carabidae* from German New Guinea and its Dependencies" published in *Deutsche Entomologisches Zeitschrift* for 1907, pp. 177-185, 467-474. Twenty-odd species are described or referred to in this work. The other is Andrewes' "Catalogue of Indian Insects. Part 18 — Carabidae" (Calcutta: Government of India, Central Publications Branch, 1930), which includes all species known from New Guinea in many of the Oriental genera (indicated by asterisks) but not in all genera.

Something more should be said about the work done by Sloane and Andrewes not on the fauna of New Guinea but on adjacent related faunas.

T. G. Sloane (1858-1932) was an Australian pastoralist, manager of a sheep station in New South Wales. Study of Carabidae was his avocation. He published about 60 papers on Australian carabids between 1881 and 1923, with final notes on paussids published posthumously in 1933. His papers include a number of important revisions and keys as well as descriptions of more than 600 new species. He worked in isolation and was not able to study the older types of Australian Carabidae in European museums. However his work was done with care and good judgment, and went a long way toward putting Australian Carabidae in practical working order. His collection was, unfortunately, allowed to deteriorate during the last years of his life.

It is now in good care at the Division of Entomology, Commonwealth Scientifie and Industrial Research Organization, at Canberra.

H. E. Andrewes (who died in 1950 at the age of 87) was at one time employed in the Indian Forest Service but was forced to leave India because of eye trouble. He retired from business at an early age and deliberately set himself the task of revising the Carabidae of the Oriental Region. For this purpose he accumulated a large private collection, and worked primarily on it and on the collection of the British Museum — he lived in London after his retirement. The results of his work were 122 papers, published from 1919 to 1947, including a series of important revisions, faunal lists (Philippines, Sumatra, Mt. Kinabalu), the useful catalogue and bibliography of "Indian" Carabidae referred to above, two fine volumes on Carabidae in the *Fauna of British India* (unfortunately he was not able to complete this work), and descriptions of hundreds of new species. In the course of his work he was able to visit most European museums and see the types of most known Oriental Carabidae. He was therefore able to put almost all the old names in their proper places, and to bring practical taxonomic order to the whole Oriental carabid fauna. He did this with good, conservative judgment. He left the Oriental carabids in shape for further work. His collection has now been added to the already outstanding collection of Oriental Carabidae at the British Museum.

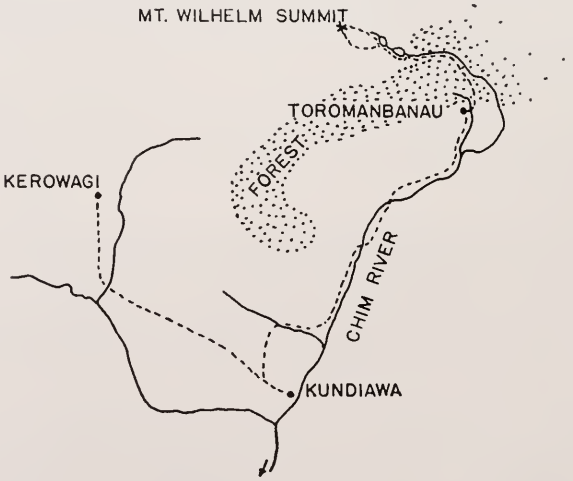
Without Sloane's work on Australian Carabidae and Andrewes' on Oriental ones it would be impossible to understand the nature and geographical relationships of the New Guinean carabid fauna.

History and background of the present work. I was a member of the Harvard Australian Expedition of 1931-1932, and as a result of it I began to accumulate a working collection of Australian Carabidae at the Museum of Comparative Zoology. During that trip I reached the middle part of the Cape York Peninsula and felt the pull of New Guinea, although I could not go there then.

During World War II I did go to New Guinea, as an army entomologist, and saw most of the occupied localities from Milne Bay to Sansapor. Two principal collections of Carabidae were made on the island while I was temporarily free of army duties. The first was at Dobodura, inland from Oro Bay and not far

from Buna, on the north side of Papua. I spent more than four months in hospital there. The hospital was in an opening in interior rain forest (different from and much richer than coastal forest) beside a fine, small river. My right arm was in a cast for the first two or three months, but I had a fresh pair of heavy army pajamas (almost the equivalent of an untailored linen suit) daily, heavy army shoes, enough vials of alcohol, and an understanding hospital commander who gave me permission to come and go as I liked. I was there from March to July, 1944, long enough to cover many square miles of rain forest, swamp, and grassland. Most of my collecting was done one-handed, but practice improved that. It was during this time that I gradually learned most of the habitats of Carabidae in New Guinea.

My second principal collection on New Guinea was made on the Bismarck Range, North-East New Guinea, where I was fortunate enough to be able to go during a two-weeks leave in October, 1944, thanks to the courtesy and aid of ANGAU, the Australia New Guinea Administrative Unit of the mandated area. I flew in from Lae in a C-47, which picked up vegetables for army hospitals. The plane landed at the Kerowagi airstrip, one of about seven grass airstrips made on the Bismarck Range



Sketch map of route to Mt. Wilhelm, Bismarck Range, North-East New Guinea. Scale: one inch = eight miles.

before the war for use of prospectors and missionaries. The strips lie a mile or more above sea level. From Kerowagi I went by jeep to Kundiawa, from there on foot up the valley of the Chim River to Toromanbanau, and thence to the summit of Mt. Wilhelm, the highest peak in the British half of New Guinea, reputedly 15,400 feet. During this trip I walked first through grassy, inhabited valleys at altitudes of from about 5,000 to 7,500 ft., then (above Toromanbanau) through mountain rain forest which became low, dense, moss-covered cloud forest toward timberline (about 11,000 ft.), then up steep slopes of tussock grass past two mountain lakes of glacial origin, and finally onto the rocks of the summit. Collecting of Carabidae, especially in the mountain forest, was very fine. This is not the place to describe this trip in more detail, but I give here a sketch map of my route, for the information of other collectors and of taxonomists working on my material.

During the war I collected also some useful material in the Philippines. After the war, as a preliminary to actual study of New Guinean (and Philippine) Carabidae, I made an effort to bring together at the Museum of Comparative Zoology a basic collection of Carabidae of the Oriental Region and Indo-Australian Archipelago, and to become familiar with them. Before the war the Museum had purchased several thousand specimens of carabids from South India, from Mr. P. Susai Nathan. This and some other, older material was put in order and partly determined, and additional Oriental Carabidae were obtained from other sources. Especially useful were specimens secured by exchange from the late H. E. Andrewes (see above), which were not numerous but which represented particularly important, identified genera and species, and a good set of Javan Carabidae received by exchange from Mr. C. J. Louwerens. All this would still have left me with a very fragmentary collection and insufficient familiarity with Oriental Carabidae if I had not been able to spend six months at the British Museum during the winter of 1947-48. This was made possible by a fellowship from the John Simon Guggenheim Memorial Foundation. At the British Museum I was able to see, besides other important material, Andrewes' collection of Oriental Carabidae including most of his types, and I arranged an exchange that added about a thousand identified species to the Museum of Comparative Zoology's Oriental carabid collection.

As a further preparation for work on New Guinean (and Philippine) Carabidae, I compiled an up-to-date list of the species of the family known from the Indo-Australian Archipelago, with a chronological bibliography of each species. The list is based on the Junk-Schenkling Catalogue, with additional names and references added from other sources.

Special preparations have been made to relate the Carabidae of New Guinea to those of Australia too. The working collection of Australian carabids at the M.C.Z., begun in 1931-1932 (see above), has been increased by purchase and exchange and by a second trip to (eastern) Australia, partly supported by a second fellowship from the Guggenheim Foundation, from December 1956 to June 1958. During this time my wife, son, and I were in the field almost continuously, traveling and living in a small truck, except for four months (May through August 1957) when we were in winter quarters in Canberra. At Canberra, incidentally, I was able to see and study Sloane's collection of Australian Carabidae, with most of his types. Our field work in 1956-1958 covered the forested eastern edge of Australia from southern Tasmania to northern Cape York. The Carabidae we obtained in North Queensland, especially on the Cape York peninsula in January and May-June 1958, have proved especially useful for comparison with New Guinean forms.

In order to complete preparation for work on Australian Carabidae, I have compiled a list and bibliography of the Australian species based on the Junk-Schenkling Catalogue, amplified and brought up to date.

Policies and methods: stages of faunal taxonomy. Three stages can be recognized in taxonomic study of a fauna of any animals, although the stages are usually not sharply separated. The first stage (comparable to alpha-taxonomy) is the random description of species as they happen to fall into the hands of specialists. The descriptions are likely to be widely scattered in different journals, and the specimens on which they are based are likely to be widely scattered in museums and private collections. Some of the descriptions are likely to be poor and some species are likely to be put in wrong genera or even wrong tribes. Nevertheless, even this initial stage in faunal taxonomy serves a useful purpose. The scattered descriptions are listed in the *Zoological Record*, and they advertise to interested persons some preliminary information about the nature of the fauna

and where specimens from it are preserved. However, there is no great loss and often much gain if the first stage is omitted and if taxonomists can go directly to the second stage, which is to put the fauna as a whole in preliminary order by appropriate taxonomic methods. This is equivalent to beta-taxonomy.

By appropriate taxonomic methods I mean methods like those of Sloane and Andrewes, and many comparable workers in other parts of the world. The methods are essentially subjective: comparison of specimens, detection of similarities and differences, and reaching of conclusions based primarily on the personal judgment and experience of the taxonomist, not on statistical analysis or other objective tests. This kind of taxonomy is not necessarily typological. Many taxonomists who practice it are conscious that they are dealing with samples of populations and are deeply interested in variations in populations. The great advantage of this kind of taxonomy is that it can be done comparatively rapidly, so that one man can cover a whole large fauna in a reasonable time and determine its general composition and geographical relationships and something of its origin and evolution. This general information is important. To get it — that is, to get an understanding of the fauna as a whole — the second-stage taxonomist has to bypass too-difficult cases, including cases that cannot be solved with the material immediately available or that require time-consuming study of situations outside the actual fauna being studied.

Third-stage taxonomy (equivalent to gamma-taxonomy) is the critical study of selected cases that cannot be solved promptly and satisfactorily by personal judgment. Some cases require world-wide revisions for their solution. Others require laborious dissections or study of larvae. Still others require complex statistical treatment. And finally some cases may require genetic breeding. This kind of work reveals relationships and sibling species that second-stage taxonomists miss, and confirms (or reverses) second-stage taxonomists' conclusions in many details. In other words third-stage taxonomy solves the problems that second-stage taxonomy leaves. But good second-stage taxonomy shows where problems are and presents them for third-stage treatment.

The present work is second-stage taxonomy. It is an attempt to classify all the Carabidae known from New Guinea (but there are probably hundreds of species still to be discovered especially in the mountains) and in general to put the whole fauna in

order within practical limits. The limits are imposed mainly by time. If I should set standards too high or allow myself to be delayed by details, I would never finish this work as a whole.

Methods: details. My methods of making descriptions, citing localities, making measurements, etc. are described in the introduction of Part II of the present work (pp. 91ff.). However, although I shall try to be reasonably consistent in editorial details, I shall not follow a single model exactly but shall vary treatment according to the requirements of each group. Moreover, I expect to vary the treatment to fit the importance or interest of each group. I have already (Part II) treated the Agonini more thoroughly than I plan to treat any other tribe of Carabidae in New Guinea, because I have a special interest in this tribe and because the Agonini is the principal tribe that has radiated on the high mountains of New Guinea. The present part, Part I, includes some smaller groups of special interest, including the Pterostichini, some of which have undergone wing atrophy and become flightless. On the other hand, the Cicindelinae are outside my usual sphere of interest and (in New Guinea) include no known flightless species except *Tricondyla aptera,* and I have treated them comparatively briefly. But these are special cases. The bulk of the present part of my work is concerned with small ground-living Carabidae (*Clivina, Tachys,* etc.) which, in New Guinea, have been poorly known until now, but of which special collecting methods have yielded much new material. These will be given something like average treatment. Part III will include a larger proportion of previously known species, most of them winged, including Harpalini which are dominant especially in open areas (but a few occur in rain forest), and also many Lebiini which are dominant arboreal Carabidae especially in rain forest (but some occur in open areas). The circumstances under which my collecting was done, particularly the difficulty of using a net one-handed, limited my catch of arboreal forms, so that my material of them is comparatively scanty and will be treated comparatively briefly.

Localities. A preliminary outline map of New Guinea with important carabid localities was included in Part II (p. 93). This map will probably be reproduced in Part IV, with additional localities added. One locality, however, should be mentioned now. It is Alfred Russell Wallace's "Dorey" or "Dory." Dorey is on the northeast corner of the Vogelkop, and Wallace

did go there (from Ternate) and spent 3 or 4 months there, beginning about the end of March, 1858. However, his specimens labeled from Dor(e)y include a number of common Oriental species of Carabidae that reach Celebes or the Moluccas but, except for Wallace's records, are not recorded from New Guinea. I have encountered so many such cases that I am convinced that Wallace accidentally mixed his collections and that many of his specimens labeled as from Dorey are really from Celebes or the Moluccas. Cases here noted include *Clivina castanea* and *wallacei*, *Apotomus*, *Tachys sericeus* and *haliploides*, *Abacetus convexiusculus*, and *Loxandrus celebensis* (see under *L. medius*). The names of these and other species, and higher groups, previously recorded from New Guinea on what I consider doubtful or erroneous grounds are put in parentheses in the following pages.

Ecology. The ecological information accompanying my specimens is scanty. It was limited by war-time conditions, by the fact that I had little time for collecting and a limited supply of vials and alcohol, so that I often had to put many specimens together under one label for each locality. I kept a list of species recognized, but many of the smaller ones were not distinguished in the field. Nevertheless, I can usually say whether a particular species was taken in rain forest or not, whether it was associated with open water or not, or whether it was arboreal. This is not ecology in the detailed, modern sense, but it permits a rough ecological classification of the species which is useful in analyzing the nature and history of the fauna.

Subspecies. The concept of subspecies has been critically re-examined by several authors recently. The re-examination is good in itself, and some criticisms of the subspecies concept have been valid, although the criticisms apply more to continental situations, where distributions are continuous, than to island populations, where distributions are interrupted. New Guinea is a very large island, on which three kinds of situations occur that can be expressed by trinomials — by use of subspecies. First, a population that is spread over the whole of New Guinea may be slightly different from related populations on other islands. Second, a species that is widely distributed on New Guinea may occur in a habitat that is discontinuous on the island. Such a species may be broken into slightly different, geographically isolated subpopulations on different mountain tops, or in different river valleys, etc. Third, a species may be

widely and more or less continuously distributed on New Guinea but may vary from locality to locality nevertheless. I am prepared to make subspecies in all of these cases, if that seems the best way to make the situation clear. In the first two kinds of situations listed above, the subspecies are isolated populations and are probably often incipient species. In the third case, in which geographical variation occurs in presumably continuous populations, recognition of subspecies is at least a useful technique of second-stage taxonomy, which helps put a whole fauna in understandable order. However, I have made subspecies very sparingly, and only when I think they really do clarify situations.

Variation. During the writing of this paper I have become increasingly impressed by the amount of variation shown by many species. Variation of certain characters among Agonini has been discussed in Part II (pp. 94ff.). In the present part, cases of *individual* variation are noted that affect supposedly specific, generic, or even tribal characters. In the genus *Clivina*, for example, the number of elytral striae that are free at base has been supposed to be characteristic of whole species-groups, but several species in New Guinea vary individually in this respect, with either 3 or 4 free striae in different individuals (see description of *C. kulti*, notes under *biroi*, and descriptions of *puncticeps, deälata, rufula, erugata*, and *subfusa*). The number of so-called "fixed" punctures on the 3rd elytral interval varies individually too in some species of *Clivina* (see description of *C. kulti*, notes under *erugatella*). In *Tachys truncatus* I have found what seems to be dimorphism in presence or absence of conspicuous foveae on the mentum, a character heretofore supposed to be constant within species and usually within species-groups. Among certain Pterostichini I have found cases of individual variation in presence or absence of the basal elytral margin (usually considered a generic character, but it varies individually in *Platycoclus archboldi*) and in presence or absence of interruptions of the elytral margin (usually considered a tribal character of Pterostichini, but individually variable in *Paraloma fortis*). *Paraloma fortis* exhibits striking asexual dimorphism in form of prothorax. And *Microschemus quadrimaculatus* (tribe Panagaeini) is apparently dimorphic in coloration. Much other, minor variation is noted in various cases in the following pages, but I am sure that what I have detected is only a small part of all the variation that really occurs in the

species in question. Third-stage taxonomists should discover much more of it. A number of cases of wing atrophy and five of apparent geographical or individual wing dimorphism (*Clivina dcälata* and *erugatella, Lesticus politus, Platycoelus depressus, Loxandrus latus*) are noted now, but full discussion of variation of wings of Carabidae in New Guinea will be postponed to Part IV.

TAXONOMIC SECTION

Subfamily CICINDELINAE

The tiger beetles are treated as a subfamily of Carabidae in the Junk-Schenkling *Coleopterorum Catalogus,* and I have included them here for the sake of completeness and because of their general interest and zoogeographic importance. However, they do not fall within my usual range of study, and I have therefore treated them in less detail than the other carabids.

Seven genera of "tigers" are represented in New Guinea. Three of them (*Tricondyla, Prothyma, Therates*) have probably extended to New Guinea from the Orient, more or less recently. Two (*Megaecphala, Distipsidera*) have evidently extended from Australia to (southern) New Guinea. One (*Caledonomorpha,* with 2 species) is endemic to New Guinea and is in fact known only from the eastern part of the island. And the final genus (*Cicindela*) is world-wide and is represented in New Guinea by about 8 stocks with various geographical relations (p. 341). *Tricondyla* is flightless. All other tiger beetles in New Guinea are winged and able to fly, so far as I know.

Our present understanding of the classification and general distribution of tiger beetles is the result of a life-time of study by the late Dr. Walther Horn, who coordinated the works of many earlier authors and added immensely to them. Of Horn's many publications, the outstanding ones that cover the Cicindelinae as a whole are Fascicule 82 of Wytsman's *Genera Insectorum* (1908-1915) and Pars 86 of the Junk-Schenkling *Coleopterorum Catalogus* (1926 — in 1959 it was still available from Uitgeverij Dr. W. Junk, Van Stolkweg 13, The Hague, Holland). In treating the older species of the subfamily I usually refer to this *Coleop(terorum) Cat(alogus)* for synonymy and references rather than repeat them in full. On the other hand, I shall not take space to cite the *Catalogus* when it adds nothing to knowledge of particular species in New Guinea. There is an out-of-date

but still useful revision of the "Cicindelidae" of Australia, by T. G. Sloane, in the *Proceedings of the Linnean Society of New South Wales*, Vol. **31**, pp. 309-360, pls. XXV-XXXI, 1906.

Key to Tribes and Genera of Cicindelinae of New Guinea

1. Metepisterna very narrow, deeply longitudinally channeled ("Alokosternale Phyle"); 4th tarsal segments asymmetrical (tribe Collyrini); elytra soldered together, inner wings minute, vestigial; form antlike, 20-25 mm (in New Guinea) (p. 334) *Tricondyla*
— Metepisterna wider, not deeply channeled ("Platysternale Phyle"); elytra not soldered, inner wings fully developed (in New Guinea) 2
2. Pronotum with anterior lateral angles (seen from sides) prominent, projecting farther forward than anterior margin of prosternum; head wide but eyes smaller and less prominent than usual (tribe Megacephalini) (p. 335) *Megacephala*
— Pronotum with anterior lateral angles not prominent (tribe Cicindelini) 3
3. Fourth segments of all tarsi very short, wide, densely pubescent below; color usually dark purplish or greenish above, often boldly banded with yellow (p. 338) *Therates*
— Fourth tarsal segments slender, not densely pubescent below 4
4. At least part of lower surface of body with decumbent white pubescence (p. 340) *Cicindela*
— Lower surface without decumbent pubescence 5
5. Labrum not toothed; elytra spined (p. 336) *Caledonomorpha*
— Labrum toothed; elytra not spined 6
6. Clypeus without setae (p. 336) *Prothyma*
— Clypeus with a pair of conspicuous setae (p. 337) *Distipsidera*

Tribe COLLYRINI

Genus TRICONDYLA Latreille

Latreille 1882, *in* Latreille and Dejean, Hist. Nat. et Iconographie Coleop. d'Europe **1**, p. 65.

Horn 1926, Coleop. Cat., Cicindelinae, p. 22 (see for additional references etc.).

TRICONDYLA APTERA (Olivier)

Olivier 1790, Entomologie **2**, no. 33, p. 7, Pl. 1, fig. 1 (*Cicindela*).

Horn 1926, Coleop. Cat., Cicindelinae, p. 27 (see for synonymy and additional references).

van Nidek 1959, Nova Guinea (new series) **10**, pp. 177, 181.

Notes. Tricondyla aptera is a well known, antlike, big-eyed, flightless tiger beetle, 20-25 mm. long, which ranges (with some

variation) from **New Guinea** (and the Cape York Peninsula of **Australia**) to the **Moluccas** and **Philippines**, **Timor**, and the **Solomons** and **New Hebrides**. It is a very common species, "represented in every consignment from New Guinea and surrounding islands" (van Nidek). It runs on tree trunks and fallen trees in rain forest by day. The genus is primarily Oriental; *T. aptera* evidently represents a rather recent extension of a *flightless* Oriental stock into the Australian Region.

Tribe MEGACEPHALINI

Genus MEGACEPHALA Latreille

Latreille 1802, Hist. Nat. Crustacés et Insectes **3**, p. 79.
Sloane 1906, Proc. Linn. Soc. New South Wales **31**, 317–327.
Horn 1926, Coleop. Cat., Cicindelinae, p. 61 (see for synonymy and additional references).

Notes. Megacephala (*sensu lato*) is discontinuously distributed, occurring in Africa (not Madagascar) and part of the Mediterranean region and south*western* Asia, in Australia and southern New Guinea, and in tropical and warm temperate America. There are about 20 Australian species, rather diverse in form and color, some fully winged, others flightless. They are usually found running on the ground near water at night, and some of them come to light. The genus is represented in New Guinea only by 2 of the winged Australian species that are recorded from Merauke in the south-coastal region of Netherlands New Guinea.

Both the species that reach New Guinea are dark with metallic reflections, with the outer margins of the elytra yellow or reddish, the pale color extending onto the disc of each elytron about ⅓ from base. The following key to the species is based on Sloane (*loc. cit.*); I have seen no specimens of this genus from New Guinea.

Key to Species of Megacephala Recorded from New Guinea

1. Prothorax with lateral margins almost entire, cariniform behind (as well as in front of) posterior transverse impression of pronotum (p. 336) . . . . . *australasiae humeralis*
— Prothorax with lateral margins obliterated posteriorly, not cariniform behind posterior transverse impression (p. 336) . . . . *bostocki*

Megacephala australasiae humeralis Macleay

Macleay 1863, Trans. Ent. Soc. New South Wales **1**, p. 9.
Horn 1913, Nova Guinea **9**, p. 409.
—— 1926, Coleop. Cat., Cicindelinae, p. 70 (see for synonymy and additional references).

Notes. This species is widely distributed in the northern half of Australia and is recorded also from Merauke, southern **Neth. N.G.**, by Horn (1913).

Megacephala bostocki Castelnau

Castelnau 1867, Trans. R. Soc. Victoria **8**, p. 36.
Horn 1913, Nova Guinea **9**, p. 409.
—— 1926, Coleop. Cat., Cicindelinae, p. 70 (see for synonymy and additional references).

Notes. Like the preceding, this northern Australian species is recorded from Merauke, southern **Neth. N.G.**, by Horn (1913). It is curious that these two very similar species should be known from New Guinea only from a single source, and I suspect some mistake, although I have no other evidence of it.

Tribe CICINDELINI

Genus Prothyma Hope

Hope 1838, Coleopterist's Manual **2**, pp. 12, 27.
Horn 1926, Coleop. Cat., Cicindelinae, p. 96 (see for synonymy and additional references).

Prothyma papua Darlington

Darlington 1947, Psyche **54**, p. 242, fig. 2.

Notes. This species is known only from the north side of Milne Bay, **Papua**, at the eastern tip of New Guinea. Its habits are unknown. It represents a primarily African-Oriental genus which occurs also in Madagascar, etc., temperate China, and Mexico, and which is represented by aberrant subgenera in Celebes, northwestern Australia, New Caledonia, Fiji (an undescribed species) and Samoa.

Genus Caledonomorpha Horn

Horn 1897, Ann. Mus. Civ. Genova (Genoa) **37**, p. 270.

Caledonomorpha jordani Horn

Horn 1897, Ann. Mus. Civ. Genova (Genoa) **37**, p. 270.
—— 1910, *in* Wytsman, Genera Insectorum, Fasc. 82, p. 179, pl. 11, fig. 12.
——1932 Rec. S. Australian Mus. **4**, p. 551 (*Caledonica*).
Darlington 1947, Psyche **54**, p. 242 [type restriction].

Notes. Known localities for *jordani* are the Astrolabe Mts., Mt. Lamington, Dobodura, and Fergusson Is., all of which are in **Papua** east of 47°E., on or near what might be called the Bird's Tail of New Guinea. Specimens that I collected near Dobodura were running and flying by day on stones and low foliage along small, rapid brooks in rain forests in foothills of the Owen Stanley Range.

Caledonomorpha milneana Darlington

Darlington 1947, Psyche **54**, p. 241, fig. 1.

Notes. This second species of *Caledonomorpha* is known only from the north side of Milne Bay, **Papua**, at the eastern tip of New Guinea, collected Dec. 1943, by myself.

Genus Distipsidera Westwood

Westwood 1837, Mag. Zool. Bot. **1**, p. 251.
Horn 1926, Coleop. Cat., Cicindelinae, p. 105 (see for additional references etc.).

Notes. *Distipsidera* occurs in the northern half of the eastern coastal region of Australia and in southern New Guinea. In Australia the larger species are usually found hunting (by day) on the trunks of *Eucalyptus* trees in open forest; some of the smaller species, on tree trunks in rain forest. One large and one small species occur in New Guinea, but their habits there are unknown.

Distipsidera papuana Gestro

Gestro 1879, Ann. Mus. Civ. Genova (Genoa) **14**, p. 556.

Notes. The types of *papuana* came from the Katau (Binaturi) and Fly R., southern New Guinea (southern **Papua**). The species is described as small, about 12 mm. long, purplish black with elytral apices greenish and a pale humeral spot and median fascia (not reaching suture) on each elytron.

Distipsidera thierfelderi Horn

Horn 1925, Ent. Mitteilungen **14**, p. 179.

Notes. Horn's single specimen of this species was from the south coast of **Neth. N.G.** The species is much larger than *papuana*, 19 mm. without the labrum, and is described as black with slight purplish or greenish reflections, with pale maculae on the elytra.

Genus Therates Latreille

Latreille 1817, *in* Cuvier, Règne Animal **3**, p. 179.

Horn 1926, Coleop. Cat., Cicindelinae, p. 110 (see for synonymy and additional references).

Notes. This is a primarily Oriental genus which extends to New Guinea and the Solomons but not to Australia. The species occur on low foliage in the undergrowth of rain forest.

Key to Species of Therates Recorded from New Guinea

1. Color above (except labrum) greenish or bluish without pale markings 2
— Conspicuously bicolored 3
2. Larger, *c.* 16-21 mm. (p. 338) ..... *labiatus*
(See also *caligatus*, p. 340.)
— Smaller, *c.* 7½ mm. (p. 339) ..... *cyaneus*
3. Metallic greenish or bluish, with a conspicuous yellow or reddish band across base of elytra (sometimes an additional pale blotch near middle of each elytron) 4
— Not metallic, more extensively pale 5
4. Larger, *c.* 13-15 mm. (p. 339) ..... *basalis*
— Smaller, *c.* 9 mm. (p. 339) ..... *festivus*
5. Head (except labrum) and prothorax piceous, elytra testaceous with a variable, sometimes divided piceous band or blotch behind middle; length *c.* 10-12 mm.; (occurrence in New Guinea doubtful) (p. 340) (*fasciatus*)
— Color testaceous with front of head and post-median elytral band dark; *c.* 8 mm. (p. 340) ..... *chaudoiri*

Therates labiatus (Fabricius)

Fabricius 1801, Systema Eleutheratorum **1**, p. 232 (*Cicindela*).

Horn 1926, Coleop. Cat., Cicindelinae, p. 110 (see for synonymy and additional references).

van Nidek 1959, Nova Guinea (new series) **10**, pp. 177, 181.

Notes. T. labiatus is widely distributed and common in **New Guinea** and occurs also on the **Aru** and **Kei** Is., and it extends west and north to the **Moluccas**, **Celebes**, and the **Philippines**, and east to the **Solomons.**

Therates basalis Dejean

Dejean 1826, Species Coléop. **2**, p. 437.
Horn 1926, Coleop. Cat., Cicindelinae, p. 111 (see for synonymy and additional references).
van Nidek 1959, Nova Guinea (new series) **10**, pp. 179, 182.

Notes. This is the only species of the genus besides *labiatus* that is common and widely distributed in **New Guinea**. It extends to several small, close-lying islands including **Waigeu** and **Misol** (but not farther west), and to the **Solomons**. Van Nidek discusses variation in dentition of the labrum.

Therates festivus Boisduval

Boisduval 1835, Voyage Astrolabe, Faune Ent. **2**, p. 13.
Horn 1926, Coleop. Cat., Cicindelinae, p. 111 (see for synonymy and additional references).
?rothschildi Horn 1896, Deutsche Ent. Zeitschrift **1896**, p. 150.
van Nidek 1959, Nova Guinea (new series) **10**, pp. 179, 182.

Notes. Horn (*loc. cit.*) records typical *festivus* from **New Guinea** and **Waigeu**, and from Misol in the **Moluccas**; van Nidek, from Misol, and from Sorong and Japen Is., **Neth. N.G.**

The form *rothschildi* Horn, with a spot near the middle of each elytron as well as the basal fascia pale, was described from Humboldt Bay, **Neth. N.G.**, and later (1926) listed also from Japen Is. ("Jobi"); van Nidek records another specimen from Japen Is. and there is one in the M.C.Z. from lower Busu River, Huon Peninsula, **N-E. N.G.**, collected May 4, 1955, in lowland rain forest, by E. O. Wilson. I doubt if *rothschildi* is even a good (geographical) subspecies.

Therates cyaneus Chaudoir

Chaudoir 1861, Bull. Soc. Nat. Moscou **34**, Part 2, No. 4, p. 357.
Horn 1926, Coleop. Cat., Cicindelinae, p. 111.

Notes. **New Guinea**, **Misol**, and **Celebes** is the distribution given by Horn (*loc. cit.*) for *cyaneus.*

Therates chaudoiri Schaum

Schaum 1860, Berliner Ent. Zeitschrift **4**, p. 185, pl. 3, fig. 1.
Horn 1926, Coleop. Cat., Cicindelinae, p. 111 (see for synonymy and additional references).

Notes. Horn records *chaudoiri* only from northwestern (**Neth.**) **New Guinea** and **Celebes**.

(Therates fasciatus [Fabricius])

Fabricius 1801, Systema Eleutheratorum **1**, p. 244 (*Cicindela*).
Horn 1926, Coleop. Cat., Cicindelinae, p. 112 (see for synonymy and additional references).

T. fasciatus has been recorded from New Guinea but Horn questions its occurrence there. It does occur in the Philippines, Celebes, and Moluccas east at least to Halmahera. Whether it extends to (western?) New Guinea remains to be discovered.

(Therates dimidiatus Dejean)

Dejean 1825, Species Coleop. **1**, p. 159.
Horn 1926, Coleop. Cat., Cicindelinae, p. 113.

T. dimidiatus is another species of which Horn questions old records from New Guinea. It inhabits the Malay Peninsula, Sumatra, Java, Borneo, and small islands in that vicinity. Its occurrence in New Guinea is therefore unlikely. It is a small species, resembling *festivus* but with spined elytra.

Therates caligatus Bates

Bates 1872, Ent. Month. Mag. **7**, p. 285.
van Nidek 1959, Nova Guinea (new series) **10**, p. 178, fig. 1 (left).

Notes. This species was described as from the Philippines but the locality may be doubtful. Van Nidek records it from the islands of **Misol** and **Waigeu** just west of the western tip of New Guinea; it has not been recorded from the mainland of New Guinea itself but may occur there. According to van Nidek it resembles *labiatus* but is smaller, with black tibiae and tarsi, and sutural angles of elytra more produced than in *labiatus*.

Genus Cicindela Linnaeus

Linnaeus 1758, Systema Naturae, ed. 10, **1**, p. 407.
Horn 1915, *in* Wytsman, Genera Insectorum Fasc. 82, p. 239.
—— 1926, Coleop. Cat., Cicindelinae, p. 127 (see for synonymy and additional references).

Notes. In the usual, broad sense this genus is world-wide (excepting some cold places and some remote islands) and includes about half of all existing species of tiger beetles — almost three-fourths of those of New Guinea. The species of the Australian Region, including New Guinea, are separately listed by Horn (1915, pp. 311-321; 1926, pp. 193-203), and I have followed his arrangement, putting his group-headings in parentheses, and interpolating recently described species.

According to Horn's (second) diagram of the phylogeny and geographical history of *Cicindela* (1915, pl. 23), the species of the genus in New Guinea represent about 8 original stocks, listed below roughly in order of age, with the oldest first.

1. The *tetrachoides* and *latreillei* groups represent a phylogenetically isolated (old?) stock that is confined to the Australian Region and has produced endemic groups in Australia as well as on New Guinea.
2. *Cicindela ancorifera,* on New Guinea, represents a stock, probably originally derived from the Orient, that has diversified especially on New Zealand (*sic*) and that is represented by endemic species-groups on Australia too.
3. The very small (usually considerably less than 10 mm.) species of the *placida-funerata, variolosa, boisduvali,* and *guineensis* groups have radiated primarily on New Guinea. Horn's diagram does not make clear whether or not they are derived from the same ancestral stock as No. 2.

4-5. *C. maino* and *denticollis* are endemic species derived from Oriental stocks.

6-8. *C. decemguttata, discreta,* and *semicincta* are widely distributed species shared with (and probably recently derived from) the Orient.

There are so many species of this genus on New Guinea and I know so few of them that I have not tried to make a key to them or even to give recognition characters. Horn characterizes the groups in *Genera Insectorum* (pp. 313-321) and summarizes the distinguishing characters of a number of the very small species (of the *placida-funerata* group, etc.) in *Deutsche Ent. Zeits.* for 1904, p. 428.

Most species of *Cicindela* hunt (by day) on the ground in open places, but a few, especially some small species, occur on low foliage of undergrowth of rain forest, often along brooks or partly cleared tracks where some sunlight comes through the forest canopy.

(Group *tetrachoides*)

CICINDELA TETRACHOIDES Gestro

Gestro 1876, Ann. Mus. Civ. Genova (Genoa) **8**, p. 514.
Horn 1926, Coleop. Cat., Cicindelinae, p. 194 (see for synonymy and additional references).
van Nidek 1953, Psyche **60**, p. 155.
—— 1959, Nova Guinea (new series) **10**, pp. 179, 182.

Notes. Horn lists this species from **New Guinea** and eastern **Ceram**. In New Guinea, it is common and widely distributed at low altitudes, and I found it on the Bismarck Range at 5,000 ft. or higher. It occurs on the ground in open places and is, I think, partly nocturnal.

CICINDELA INAEQUIDENS van Nidek

van Nidek 1959, Nova Guinea (new series) **10**, p. 179.

Notes. van Nidek distinguishes this species (from the preceding one) by its more evenly punctulate elytra; sides of elytra near apex strongly bent inwards; sutural angles of elytra denticulate in female. The types of this and of the preceding species are from Dilo, south coast of **Papua**, but this as well as the preceding species, is widely distributed in **New Guinea**, and this occurs also on Morotai Is., **Moluccas**. It would be interesting to know whether their habits differ.

(Group *latreillei*)

CICINDELA LATREILLEI Guerin

Guerin 1830, *in* Duperrey, Voyage Coquille, Zool. **2**, Part 2, First Div., p. 57 (*latreillii*), Atlas, Ins. pl. 1, fig. 5, a, b.
Horn 1926, Coleop. Cat., Cicindelinae, p. 194 (see for synonymy and additional references).
van Nidek 1959, Nova Guinea (new series) **10**, p. 182.

Notes. The *latreillei* group is confined to New Guinea including Japen Is. The species *latreillei* is recorded from Dorey in western **Neth. N.G.**; **Japen Is.**; lower slopes of the Snow Mts. at 800-1500 m. (*c.* 2,600-4,875 ft.); and the Fly R., **Papua**.

CICINDELA LATREILLEI VIRIDITHORACICA van Nidek

van Nidek 1959, Nova Guinea (new series) **10**, p. 180.

Notes. Described from Klamono (Vogelkop) and Geelvink Bay, **Neth. N. G.** The status of this form is not yet clear. It can hardly be a geographical subspecies.

Cicindela velutina van Nidek

van Nidek 1959, Nova Guinea (new series) **10**, p. 182.

Notes. A species of the *latreillei* group, described from 10 specimens collected around Sigi Camp and Lower Mist Camp, Snow Mts., **Neth. N. G.** The altitudes are between 1350 and 1700 m. (a little below or above 5000 ft.).

Cicindela viridimicans van Nidek

van Nidek 1959, Nova Guinea (new series) **10**, p. 183.

Notes. Another new species of the *latreillei* group, described from 15 specimens from Araucaria Camp, Rattan Camp, and Lower Mist Camp, on or near the lower slopes of the Snow Mts., **Neth. N. G.** Altitudes are from 800 to 1700 m. (*c.* 2,600-5,525 ft.).

Cicindela alticola van Nidek

van Nidek 1959, Nova Guinea (new series) **10**, p. 183.

Notes. Still another species of the *latreillei* group, described from Top Camp, 2100 m. (*c.* 6,825 ft.) in the Snow Mts., **Neth. N. G.**

Cicindela rudolf-bennigseni Horn

Horn 1912, Ent. Mitteilungen **1**, p. 306.
van Nidek 1959, Nova Guinea (new series) **10**, p. 184.

Notes. The type locality is Sattelberg, Huon Peninsula, **N-E. N. G.**; van Nidek records the species from mountain slope above Bernhard Camp, 750 m. (*c.* 2,400 ft.), and Araucaria Camp, 800 m. (*c.* 2,600 ft.), **Neth. N. G.**

Cicindela nigrivestis van Nidek

van Nidek 1959, Nova Guinea (new series) **10**, p. 184.

Notes. The fourth new species of the *latreillei* group described by van Nidek in the paper cited. It is known from 4 specimens from mountain slope above Bernhard Camp, near Araucaria Camp, and Rattan Camp. Altitudes are 750-1200 m. (*c.* 2,400-3,900 ft.).

Cicindela darlingtoni van Nidek

van Nidek 1953, Psyche **60**, p. 155, figs. 6, 7.

Notes. The types are from Dobodura, **Papua**.

(Group *decemguttata*)

CICINDELA DECEMGUTTATA URVILLEI Dejean

Dejean 1831, Species Coléop. **5**, p. 225 (*durvillei*).
Horn 1926, Coleop. Cat., Cicindelinae, p. 196 (see for additional references etc.).
van Nidek 1953, Psyche **60**, p. 156, figs. 4, 5.
—— 1957, Treubia **24**, pp. 1–2, map.
—— 1959, Nova Guinea (new series) **10**, pp. 180, 184.

Notes. According to Horn (*loc. cit.*), typical *decemguttata* occurs in **Celebes**, the **Moluccas**, **Kei Is.**, etc.; subspecies *urvillei*, in the **Moluccas**, **New Guinea**, **Bismarck Archipelago** etc.; other subspecies, in the **Solomons**. Van Nidek (1957) discusses and maps the boundary between *decemguttata sensu stricto* and subspecies *urvillei* in the Moluccas. The species does not reach Australia. It (represented by *urvillei*) is common and widely distributed in New Guinea, on the ground in open places. It is a rather large (*c.* 13-14 mm.) *Cicindela*, dark dull gray with, typically, 5 white marks on each elytron, but the marks vary somewhat (van Nidek 1953).

(Group *discreta*)

CICINDELA DISCRETA Schaum

Schaum 1863, J. Ent. **2**, p. 59.
Horn 1926, Coleop. Cat., Cicindelinae, p. 196 (see for synonymy and additional references).
van Nidek 1953, Psyche **60**, p. 156.
—— 1959, Nova Guinea (new series) **10**, p. 184.

Notes. C. discreta occurs in **Sumatra**, **Java**, **Borneo**, etc., the **Philippines**, **Celebes**, the **Moluccas**, **New Guinea**, **New Britain**, and North Queensland, **Australia**. It is a rather small species, found on the ground in open places.

(Group *semicincta-moseri*)

CICINDELA SEMICINCTA Brullé

Brullé 1834, *in* Silbermann, Rev. Ent. **2**, p. 100.
Horn 1926, Coleop. Cat., Cicindelinae, p. 197 (see for synonymy and additional references).
—— 1932, Rec. S. Australian Mus. **4**, p. 551.
van Nidek 1953, Psyche **60**, p. 158.

Notes. Horn gives the range of *semicincta* as from **New Guinea**, etc. (including the **Kei Is.**) and the **Bismarck Archipelago** to the **New Hebrides**, **Loyalty Is.**, **New Caledonia**,

and much of northern and eastern **Australia**. It is another rather small species which occurs on the ground in open places. The 2 other species of the group occur on Timor and the Tanimbar Is.

(Group *placida-funerata*)

(Subgroup A)

Cicindela excisilabris Horn

Horn 1905, Deutsche Ent. Zeits. **1905**, p. 160.

Notes. The type was from "**Neu Guinea**" without more exact locality.

Cicindela pupilligera Chaudoir

Chaudoir 1865, Cat. Coll. Cicindélètes, p. 59.
Horn 1904, Deutsche Ent. Zeits. **1904**, p. 428.

Notes. Chaudoir's specimen was "Envoyée par M. Wallace, comme trouvée à Nouvelle-Guinée," and presumably came from Dorey, **Neth. N. G.**

Cicindela io Horn

Horn 1900, Deutsche Ent. Zeits. **1900**, p. 203.
—— 1904, Deutsche Ent. Zeits. **1904**, p. 428.
——1915, *in* Wytsman, Genera Insectorum, Fasc. 82, p. 317, pl. 18, fig. 8.
van Nidek 1953, Psyche **60**, p. 158.

Notes. The types were from Milne Bay, **Papua**. I found the species at the same locality in December, 1943 (van Nidek det.).

Cicindela io micro-gemmea Horn

Horn 1932, Rec. S. Australian Mus. **4**, p. 551, fig. 2, a, b.
van Nidek 1953, Psyche **60**, p. 158.

Notes. Mt. Lamington, **Papua**, is the type locality of this form. I found it at Dobodura, Mar.-July, 1944 (van Nidek det.).

Cicindela delicata Bates

Bates 1874, Ent. Month. Mag. **10**, p. 265.
Horn 1904, Deutsche Ent. Zeits. **1904**, p. 428.
—— 1913, Arch. f. Naturg. **79**, Abt. A, Heft 11, p. 31 (as *innocens angustiformis*).
—— 1926, Coleop. Cat., Cicindelinae, p. 198.

Notes. Bates described *delicata* from "New Guinea (Wallace)," which presumably means Dorey, **Neth. N. G.** Horn's "*innocens angustiformis,*" from Roon Is. (Geelvink Bay), **Neth. N. G.**, is placed as a form of *delicata* in the *Coleopterorum Catalogus.* I do not know whether it is a recognizable subspecies.

Cicindela placida Schaum

Schaum 1863, J. Ent. **2**, p. 60.
Horn 1904, Deutsche Ent. Zeits. **1904**, p. 428.
—— 1915, *in* Wytsman, Genera Insectorum, Fasc. 82, pl. 21, fig. 252.
—— 1926, Coleop. Cat., Cicindelinae, p. 198.

Notes. Schaum's type(s) came from "Mysol (D. Wallace)" in the **Moluccas**, and Horn (1926) lists the species also from **New Guinea**.

Cicindela innocens Horn

Horn 1893, Deutsche Ent. Zeits. **1893**, p. 199.
—— 1913, Nova Guinea **9**, Zool. 3, p. 410.

Notes. The type was a ♀ from "Nova Guinea," but Horn (1913) later recorded a ♂ from "Heuvel-Biwak (Lorentz: XI 1909, 750 m.)," which is apparently in the region of the upper Lorentz R., **Neth. N. G.**

(Group *placida-funerata,* cont'd)
(Subgroup B)

Cicindela pupillata Schaum

Schaum 1863, J. Ent. **2**, p. 60.
Horn 1904, Deutsche Ent. Zeits. **1904**, p. 428.
—— 1926, Coleop. Cat., Cicindelinae, p. 198.

Notes. This species too (like *placida*) was described from "Mysol (D. Wallace)" in the **Moluccas** but is listed also from **New Guinea** by Horn (1926).

Cicindela aruana Dokhtouroff

Dokhtouroff 1887, Ann. Soc. Ent. Belgique **31**, p. 155.
Horn 1904, Deutsche Ent. Zeits. **1904**, p. 428.

Notes. So far as I know, this species has been recorded only from the **Aru Is.**, which belong with New Guinea, faunistically.

Cicindela loriae Horn

Horn 1897, Ann. Mus. Civ. Genova (Genoa) (2) **17**, p. 272.
—— 1904, Deutsche Ent. Zeits. **1904**, p. 428.
—— 1926, Coleop. Cat., Cicindelinae, p. 198 (*loriai*).

Notes. *C. loriae* is, I think, known only from the type locality, "Paumomu Riv. (Nouvelle Guinée britannique [= **Papua**])."

Cicindela innocentior Horn

Horn 1904, Deutsche Ent. Zeits. **1904**, p. 427.

Notes. Sattelberg, on the Huon Peninsula, **N-E. N. G.**, is the type locality.

Cicindela pseudo-pupillata Horn

Horn 1938, Ent. Beihefte Berlin-Dahlem **5**, p. 12, pl. 59, fig. 26.

Notes. Horn's single specimen was from 900 m. (*c.* 2,925 ft.) altitude in the Torricelli Mts., **N-E. N. G.**

Cicindela denudata Horn

Horn 1935, Nova Guinea **17**, p. 301.

Notes. Kokoda, **Papua**, 1,200 ft. altitude, is the type locality.

Cicindela cheesmanae van Nidek

van Nidek 1954, Ann. Mag. Nat. Hist. (12) **7**, p. 391, fig. 1 and pl. 9 (*cheesmannae*).

Notes. The types are from Camp Nok, Waigeu Is., **Neth. N. G.**, 2,500 ft. altitude.

Cicindela klynstrai van Nidek

van Nidek 1954, Ann. Mag. Nat. Hist. (12) **7**, p. 393, fig. 2 and pl. 9.

Notes. The types are from Japen ("Japan") Is., 500 ft. altitude, **Neth. N. G.**

(Group *placida-funcrata*, cont'd)
(Subgroup C)

Cicindela bennigsenia Horn

Horn 1901, Deutsche Ent. Zeits. **1901**, p. 357.
—— 1904, Deutsche Ent. Zeits. **1904**, p. 428.
—— 1932, Rec. S. Australian Mus. **4**, p. 551, fig. 1, a, b.
van Nidek 1953, Psyche **60**, p. 158.

Notes. Known localities for *bennigsenia* are Hercules R. (?Hercules Bay, eastern **N-E. N. G.**) (type locality) and Mt. Lamington and Dobodura, **Papua**.

Cicindela funerata Boisduval

Boisduval 1835, Voyage Astrolabe, Faune Ent. **2**, p. 4, pl. 6, fig. 1.
Horn 1904, Deutsche Ent. Zeits. **1904**, p. 428.
—— 1926, Coleop. Cat., Cicindelinae, p. 199 (see for synonymy and additional references).
—— 1932, Rec. S. Australian Mus. **4**, p. 551.
van Nidek 1953, Psyche **60**, p. 159 (*funerata barbata*).
—— 1959, Nova Guinea (new series) **10**, pp. 184 (*funerata*), 185 (*barbata*).

Notes. According to Horn (1926), this species occurs on **New Guinea** and adjacent islands and west to Batjan and Buru in the **Moluccas**, and subspecies *barbata* Horn occurs on the **Bismarck Archipelago** and perhaps the **Solomons**; but van Nidek assigns specimens from eastern New Guinea to *barbata*. I do not know whether *barbata* is really a recognizable, geographic subspecies. I found the species common at Dobodura and took it also at Milne Bay, **Papua**, and near Nadzab, **N-E. N. G.**, and there is a long series in the M.C.Z. from Surprise Creek on the Morobe Plateau (also **N-E. N. G.**) (Stevens).

Van Nidek (1959) now considers that *funerata* and *barbata* are distinct species. He may be right, but I cannot now unscramble the old citations and records, so I shall let the two forms stand as one species for the time being.

(Group *placida-funerata*, cont'd)
(Subgroup doubtful)

Cicindela toxopeusi van Nidek

van Nidek 1959, Nova Guinea (new series) **10**, p. 185.

Notes. According to van Nidek, this should be a rather isolated species of the *placida-funerata* group, characterized by a pattern of elytral spots different from all other species of the group. It is described from 22 specimens from Bernhard Camp, the mountain slope above it, Araucaria Camp, and Rattan Camp, **Neth. N. G.** Altitudes are from 50 to 1200 m. (*c.* 150 to 3,900 ft.).

CICINDELA OLTHOFI van Nidek

van Nidek 1959, Nova Guinea (new series) **10**, p. 186.

Notes. Related to the preceding species, and described from 5 specimens from Bernhard Camp and the mountain slope above it, **Neth. N. G.**, 50-750 m. (*c.* 150-2,400 ft.).

(Group *variolosa*)

CICINDELA VARIOLOSA Blanchard

Blanchard 1853, Voyage au Pole Sud—L'Astrolabe et La Zélée, Zool. **4**, p. 6, Atlas Ins. pl. 1, fig. 4.
Horn 1926, Coleop. Cat., Cicindelinae, p. 199.

Notes. This species was described as from the south coast of **New Guinea**. Horn questions its occurrence in New Guinea (I do not know why) and records it from Batjan in the **Moluccas**.

(Group *boisduvali*)

CICINDELA BOISDUVALI Horn

Horn 1896, Deutsche Ent. Zeits. **1896**, p. 152.
—— 1904, Deutsche Ent. Zeits. **1904**, p. 428.
—— 1913, Nova Guinea **9**, Zool. 3, p. 410.
van Nidek 1959, Nova Guinea (new series) **10**, p. 186.

Notes. The types were from Humboldt Bay; Horn later (1913) recorded specimens from Alkmaar, on the upper Lorentz R., and van Nidek, from Hollandia and Bernhard Camp at low altitudes; all these localities are in **Neth. N. G.**

CICINDELA KAMPENI Horn

Horn 1913, Tijd. v. Ent. **56**, p. 310.

Notes. Described from 1 ♂ from Hollandia, **Neth. N. G.**

(Group *guineensis*)

CICINDELA GUINEENSIS Horn

Horn 1892, Deutsche Ent. Zeits. **1892**, p. 77.
—— 1904, Deutsche Ent. Zeits. **1904**, p. 428.
—— 1932, Rec. S. Australian Mus. **4**, p. 252, fig. 4.
van Nidek 1959, Nova Guinea (new series) **10**, p. 186.

Notes. Horn's type came from "**Neu-Guinea.**" I do not think typical *guineensis* was recorded from a more exact locality until van Nidek reported 3 from Bernhard Camp, **Neth. N. G.**

Cicindela guineensis umbrosa Horn

Horn 1932, Rec. S. Australian Mus. **4**, p. 553, fig. 3, a, b.
van Nidek 1953, Psyche **60**, p. 159.

Notes. The types of *umbrosa* were from Mt. Lamington, **Papua**, and I found it at Dobodura (van Nidek det.).

(Group *ancorifera-parryi-tuberculata*)

Cicindela ancorifera Horn

Horn 1897, Ann. Mus. Civ. Genova (Genoa) (2) **17**, p. 271.
—— 1926, Coleop. Cat., Cicindelinae, p. 199.
van Nidek 1953, Psyche **60**, p. 159.
—— 1959, Nova Guinea (new series) **10**, p. 186.

Notes. The type locality is Hatam, in the Arfak Mts. of Western **Neth. N. G.** Van Nidek (1953) records specimens from the Bismarck Range at 5,000-7,500 ft. altitude (taken by me) and Mt. Misim at 6,400 ft. in the Morobe District (Stevens), and Prof. E. O. Wilson took specimens at Tumnang, 1,400-1,600 m. (*c.* 4,300-4,900 ft.), and between Nganduo and Yunzain, 1,000-1,500 m. (*c.* 3100-4,625 ft.) on the Mongi watershed in the mountains of the Huon Peninsula; all these localities are in **N-E. N. G.** Van Nidek later (1959) notes specimens from Rattan, Sigi, Lower Mist, and Mist Camps in the Snow Mts., **Neth. N. G.**, at altitudes of 1200-1800 m. (*c.* 3,900-5,825 ft.). The species is apparently widely distributed in New Guinea at middle altitudes. The great interest of *ancorifera* is in its apparent geographical relationships: all the other species of its group are confined to New Zealand! Further study is needed to show whether this is a real relationship or a result of convergence. *C. ancorifera* lives on the ground in open places.

(Group *maino*)

Cicindela maino Macleay

Macleay 1876, Proc. Linn. Soc. New South Wales **1**, p. 165.
Horn 1915, *in* Wytsman, Genera Insectorum, Fasc. 82, p. 320, pl. 19, fig. 1.

Notes. Macleay's specimens were collected on the sea beach at the mouth of the Katow (Binaturi) R., and Horn lists the species also from Redscar Bay. Both localities are on the south coast of **Papua**. It is a striking, fusiform, very long-legged species with complex markings. Horn (*op. cit.*, p. 312) says it is derived from an Oriental stock.

(Group *denticollis*)

CICINDELA DENTICOLLIS Horn

Horn 1895, Deutsche Ent. Zeits. **1895**, p. 88.
—— 1915, *in* Wytsman, Genera Insectorum, Fasc. 82, p. 321.

Notes. Although the types were from "Nov.-Guinea" without further locality, Horn later gives the species' range as northwestern (**Neth.**) **N. G.** and the **Aru Is.** This species too is derived from a (different) Oriental stock (Horn, *op. cit.*, p. 321).

Subfamily CARABINAE

Although this is an artificial or composite subfamily, it is recognized in the *Coleopterorum Catalogus*, and it is temporarily useful as a device for arranging the elements of a complex family of which the phylogeny is not yet understood.

Tribe OZAENINI

Ozaenini Auct., including Bänninger 1927, Deutsche Ent. Zeits. **1927**, p. 177.
Ozaenidae Auct., including Jeannel 1946, Coléop. Carabiques de la Région Malgache, Part 1, p. 46.

Notes. This apparently primitive tribe is almost pantropical in distribution. A single genus and species of it reach New Guinea, from the Orient.

Genus PSEUDOZAENA Castelnau

Castelnau 1834, Étude Ent. **1**, p. 55.
Bänninger 1927, Deutsche Ent. Zeits. **1927**, p. 192.
Jeannel 1946, Coléop. Carabiques de la Région Malgache, Part 1, p. 48.

Diagnosis. None required here. This is the only ozaenine genus in New Guinea.

Description. See references given above.

Genotype. P. megacephala Castelnau = *Ozaena orientalis* Klug.

Generic distribution. As limited by Bänninger, the genus is confined to the Malay Peninsula, Formosa, and the Indo-Australian Archipelago east to the Philippines, New Guinea, the Admiralties, the Solomons, and (introduced?) the Palau Is. In the broader sense of Jeannel, it occurs also in eastern tropical Asia, Africa, and Madagascar.

Pseudozaena orientalis opaca (Chaudoir)

Picrus opacus Chaudoir 1868, Ann. Soc. Ent. Belgique **11**, p. 46.
Pseudozaena opaca Andrewes 1924, Ann. Mag. Nat. Hist. (9) **14**, p. 585.
Pseudozaena tenebrosa Sloane 1890, Rec. Australian Mus. **1**, p. 102.
Pseudozaena tricostata tenebrosa Bänninger 1927, Deutsche Ent. Zeits. **1927**, p. 192.
Pseudozaena tricostata opaca Gressitt 1953, Bull. Bishop Mus. No. 212, p. 95, fig. 45a.

Description. None required here, except to note that the species is winged. See figure 1.

Types. Of *opacus* Chaudoir, apparently from Ceram and Ternate in the **Moluccas** (Andrewes 1924), now presumably in the Oberthür Collection at the Paris Mus.; of *tenebrosa* Sloane, from British New Guinea (**Papua**), now probably in the Sloane collection at Canberra, Australia.

Occurrence in New Guinea. **Papua**: Dobodura, Mar.-July 1944 (Darlington)[1]; Kokoda, 1,200 ft., (Cheesman)[1]; Port Moresby area (L. Jones, British Mus.); Brown R., May 22, 1956 (E. J. Ford, Jr., Bishop Mus.); Daru, mouth of Fly R., July 1941 (R. G. Wind, California Acad.); Kiunga, Fly R., July 23-25, 1958 (W. W. Brandt, Bishop Mus.); Kikori, Feb. 27, 1920 (J. T. Zimmer, Chicago Mus.). **N-E. N. G.**: Aitape, Aug. 1944 (Darlington); Stephansort, Astrolabe Bay (Biró, Hungarian National Mus.); Torricelli Mts., Mokai Village, 750 m. (*c.* 2450 ft.), Dec. 8-15, 1958 (W. W. Brandt, Bishop Mus.). **Neth. N. G.**: Humboldt Bay region, including Hollandia and Cyclops and Bewani Mts. up to 1,200 ft. (various sources); mountain slope above Bernhard Camp, 100 m. (about 325 ft.), April 1939 (Toxopeus); Araucaria Camp, Snow Mts., 800 m. (about 2,600 ft.), Mar. 1929 (Toxopeus); Upper Setekwa R., Snow Mts. (*t.* Bänninger); route of the Kaiserin-Augustafluss Expedition (*t.* Bänninger); Geelvink Bay, 1878 (Raffray & Maindron, Paris Mus.); Arfak Mts. (*t.* Bänninger); Wasian, Sept. 1939 (R. G. Wind, M.C.Z.). Several additional specimens seen without exact localities or from localities I have not been able to find. The records suggest that this insect occurs throughout New Guinea from sea level into the foothills of the mountains. As to its habits, I have taken it in flood debris and have seen specimens collected "at

[1] For disposition of material and for abbreviations used see present part of this work, p. 324, and part 2 (1952), pp. 90-91.

light'' and (from the Philippines) ''in sawdust at mill.'' Gressitt (*loc. cit.*) says that, in the Palau Is., it is ''a moderately common predaceous beetle in logs and trunks where *Oryctes* is found. . . . One adult kept in the laboratory fed for five weeks on *Oryctes* eggs alone, and another lived for three weeks on eggs and young larvae only.''

Notes. After examination of new material, including 39 specimens from New Guinea originally assembled for study at the M.C.Z. (more seen later), and after comparison of the ♂ copulatory organs, I am prepared to go even further than Bänninger (1927) in reducing the number of forms in this genus, and to recognize in *Pseudozaena sensu stricto* only one species with three geographical subspecies: typical *orientalis* (Klug) of the Malay Peninsula, Sumatra, Java, and Borneo; subspecies *opaca* (Chaudoir) of **Formosa**, the **Philippines**, the **Moluccas**, **New Guinea**, and the **Palau Is.** (if native there); and subspecies *tricostata* Montrousier of New Britain and the Solomons. A specimen from the Kei Is. (H. C. Siebers, British Mus.) has stood in the Andrewes Collection under *orientalis*, but is actually *opaca*. It is probably the basis of Andrewes' Kei Is. record of *orientalis;* the Kei Is. should be deleted from the range of this form. Specimens from both New Guinea and the Philippines vary so much in sculpture of elytra that I cannot distinguish the New Guinean population as a separate subspecies. A specimen from Waigeu Is., west of New Guinea (Cheesman), and 3 from the Admiralty Is. (U.S.N.M., Bishop Mus.) are like *tricostata*, but should not be referred to that subspecies without examination of additional material. These specimens from coastal islands *may* be relicts of a tricostate population that *may* formerly have occurred on New Guinea but that (if it occurred) has changed or been replaced.

Tribe PAUSSINI

Paussidae Auct. (in part).

Paussini Darlington 1950, Trans. Amer. Ent. Soc. (Philadelphia), **76**, p. 90.

Although often treated as a separate family, the paussids are derived from the Ozaenini and are best placed after them in the Carabidae (Darlington *op. cit.*).

Only two species of paussids have been recorded from New Guinea, one representing an Australian genus the other an Oriental one, but the occurrence of the latter in New Guinea is doubtful.

Key to Genera of Paussini Recorded from New Guinea

1. Antennae with 10 free segments, the 9 flagellar ones expanded and flattened ..... *Arthropterus*
— Antennae appearing 2-segmented, the flagellum fused, with 2 conspicuous processes posteriorly ..... *Euplatyrhopalus*

Genus ARTHROPTERUS Macleay

Macleay 1838, *in* A. Smith, Illustrations Zool. S. Africa, Invertebratae, p. 75.

Gestro 1910, Junk-Schenkling Coleop. Cat., Paussidae, p. 7 (see for additional references etc.).

Darlington 1950, *op. cit.*, pp. 94, 95, 106.

Diagnosis. See Darlington, *op. cit.*

Description. None needed here.

Genotype. Cerapterus macleayii Donovan, of Australia.

Generic distribution. Living only in Australia (many species) and New Guinea (1 species); supposedly fossil in the Baltic amber in Europe (several species).

ARTHROPTERUS NOVELLUS Kolbe

Kolbe 1924, Ent. Mitteilungen **13**, p. 72.

Description. None needed here.

Types. Two specimens labeled only "New Guinea" (Staudinger), in Stettin and Berlin Museums.

Occurrence in New Guinea. Known only from the types.

Notes. The state of the wings in this species is unknown. In Australia, the wings are fully developed in some *Arthropterus*, vestigial in others.

Genus EUPLATYRHOPALUS Desneux

Desneux 1905, *in* Wytsman's Genera Insectorum, 35me fasc., Paussidae, p. 18.

Darlington 1950, Trans. American Ent. Soc. (Philadelphia) **76**, pp. 98, 107.

Diagnosis. See Darlington, *op. cit.*

Description. None needed here.

Genotype. Platyrhopalus aplustrifer Westwood, of India.

Generic distribution. India and Burma to Sumatra and Java; and perhaps New Guinea. (No paussid of any sort is yet known from Celebes or the Moluccas.)

Euplatyrhopalus wasmanni van Emden

van Emden 1927, Ent. Blatter **23**, p. 127.

Description. None required here. The species is probably fully winged.

Type. From **New Guinea**? According to van Emden, it may really be from Borneo; type should be in Dresden Mus.

Occurrence in New Guinea. Known only from the type — if it came from New Guinea.

Tribe SCARITINI

Scaritini Auct., including Andrewes 1929, Fauna British India etc., Coleop., Carabidae **1**, p. 208.

Scaritidae Auct., including Jeannel 1946, Coléop. Carabiques de la Région Malgache, Part 1, p. 212.

New Guinea has relatively few genera of this tribe, only 3, against more than 15 in the Orient and about 20 in Australia. The dominant, nearly cosmopolitan genus, *Scarites*, which includes many Oriental species, extends east to Celebes and Timor but does not reach New Guinea or Australia. And the dominant Australian "carenums," with about a dozen genera and hundreds of species in Australia, are still unknown in New Guinea, although one or two species of them may yet turn up in southern New Guinea, in the extensive, open Eucalyptus country there.

Key to Genera of Scaritini Known from New Guinea

1. First segment of antenna received in deep groove under eye; antenna with first 4 segments glabrous (except for fixed tactile setae); 1 supraocular seta over each eye (subtribe Scaritina) ..... *Geoscaptus*
— First segment of antenna not received in deep groove; antenna with first 2 segments glabrous; 2 supraocular setae ever each eye (subtribe Clivinina) 2
2. Elytra strongly dentate at humeri; antennal segment 2 attached very eccentricly to segment 1; length (in New Guinea) *c.* 3½ mm. ... *Syleter*
— Elytra not dentate at humeri; first 2 segments of antenna normal; length (in New Guinea) *c.* 4–18 mm. ... *Clivina*

Genus Geoscaptus Chaudoir

Chaudoir 1855, Bull. Soc. Nat. Moscou **28**, Part 1, No. 1, p. 5.
Sloane 1905, Proc. Linn. Soc. New South Wales **30** pp. 103–108.

Bänninger 1937, Deutsche Ent. Zeits. **1937**, pp. 118, 133–137. (Selected references only)

Diagnosis. Subcylindrical, shining black, *Scarites*-like carabids, with the maxillae broadly rounded apically, not curved in and not pointed or toothed as in *Scarites* etc.

Description. None required here.

Genotype. Geoscaptus laevissimus Chaudoir of Australia.

Generic distribution. Eastern and northern Australia, New Guinea.

Geoscaptus cacus (Macleay)

Scarites cacus Macleay 1863, Trans. Ent. Soc. New South Wales **1**, p. 67.
Geoscaptus cacus Bänninger 1937, Deutsche Ent. Zeits. **1937**, pp. 135, 136. (Selected synonymy and references only.)

Description. See generic description and figure 2. Within the genus, this species is notably convex (subcylindrical) and relatively small, 16-24 mm. (Bänninger). Specimens from New Guinea are near the minimum size for the species, *c.* 16-20 mm.

Type. From "Port Denison" (near Bowen, Queensland, Australia); should be in Macleay Mus., Sydney.

Occurrence in New Guinea. **Papua**: 1, Port Moresby area, May 1947 (L. Jones, British Mus.); 2, Dobodura, Mar.-July 1944 (Darlington). **N-E. N. G.**: 1, vic. Nabzab, July 1944 (Darlington). **Neth. N. G.**: 1, Hollandia, Apr. 1945 (Malkin, U.S.N.M.). The habitat in New Guinea is not recorded, but in Australia the genus occurs (by day) under cover near water.

Notes. Widely distributed also in northern and eastern **Australia**. The species (like others of the genus) is winged and probably a good flier.

Genus Syleter Andrewes

Andrewes 1941, Ann. Mag. Nat. Hist. (11) **7**, p. 317.
Psilus Putzeys 1877, Ann. Soc. Ent. Belgique **20**, Compt. Rend., p. 46.
Andrewes 1929, Fauna British India etc., Coleop., Carabidae **1**, pp. 344, 386–389.

Diagnosis. See preceding references and key to genera.

Description. See Andrewes 1929, pp. 386-387.

Genotype. Ardistomis paradoxa Putzeys of Siam, etc.

Generic distribution. Burma and Indochina to the Philippines, New Guinea, and the tip of Cape York, Australia; Africa.

Syleter papua n. sp.

Description. Form (fig. 3) of *Ardistomis* (rather like stout *Dyschirius*); reddish piceous, elytra darker, appendages dark reddish; surface moderately shining, reticulate microsculpture approximately isodiametric on front of head, pronotum, and striae of elytra, absent on elytral intervals, which polished and shining. *Head* .59 and .59 width prothorax; eyes prominent (normal), genae short and oblique; antennae normal for genus, outer segments slightly longer than wide; labrum 7-setose (single setae sometimes missing); clypeus truncate with angles rounded, clypeal suture obliterated; frontal sulci deep, subparallel, but irregular and slightly curved outward in front and behind; a strong ridge along outer edge of each sulcus above eye, separated from eye by a channel; front otherwise almost evenly convex except often with a faint longitudinal impression at middle, impunctate; neck impressed only at sides, with a row of punctures on each side but widely interrupted at middle. *Prothorax* broad, rounded; width/length (including peduncle) 1.05 and 1.07; sides broadly rounded anteriorly, more strongly posteriorly; anterior angles blunt, only slightly prominent, posterior ones broadly rounded but marked by faint teeth; apex broadly emarginate, truncate at middle; lateral margins entire, each with usual 2 setae, at basal angle and about ⅓ from apex; disc convex, with deep transverse impression anteriorly and shallower longitudinal median line, and with a small cluster of vague punctures on each side a little behind middle, but otherwise impunctate. *Elytra* 1.18 and 1.19 width prothorax; base emarginate between ends of 4th striae, with tubercles at anterior ends of 2nd and 3rd intervals; base strongly margined on each side from 4th striae to humeri; latter strongly toothed, and margins behind them crenulate; sides slightly diverging behind humeri, then broadly rounded to apices; disc strongly convex; striae deep and entire, reticulate rather than punctate; intervals moderately convex, impunctate, except 3rd interval 3-punctate, with anterior puncture near 3rd striae and other two near 2nd one. *Inner wings* fully developed. *Lower surface* microreticulate and in part roughened but not distinctly punctate. *Legs:* front tibia with a long, curved apical process and 2 strong teeth externally; middle tibia without spur. *Measurements:* length (in normal position) *c.* 3.3-3.8; width *c.* 1.1-1.3 mm.

Types. Holotype ♂ (M.C.Z. No. 30,152) and 22 paratypes

from Dobodura, **Papua**, Mar.-July 1944 (Darlington). Additional paratypes as follows: **Papua**: 13, Oro Bay, Dec. 1943-Jan. 1944 (Darlington). **Neth. N. G.**: 10, Hollandia, July-Sept. 1944 (Darlington); 52, Maffin Bay, Aug. 1944 (Darlington) and 12, same locality, Aug. 1944 (E. S. Ross, California Acad.). My specimens were all taken in very wet places in and around shaded swamps.

Measured specimens. The ♂ holotype and 1 ♀ paratype from Dobodura.

Notes. This species occurs also in northern Cape York, **Australia**. It is similar to and probably a representative of *Syleter paradoxus* (Putzeys) of southeastern Asia, Sumatra, and Borneo, but as compared with *paradoxus* in the Andrewes Collection the present new species is a little broader, with relatively broader prothorax, and with the line of punctures across the neck more widely interrupted at middle.

Genus Clivina Latreille

Latreille 1802, Hist. Nat. Crustacés et Insectes **3**, p. 96.
Sloane 1896, Proc. Linn. Soc. New South Wales **21**, pp. 143–257, 275–280 (the Australian species).
—— 1904, Proc. Linn. Soc. New South Wales **29**, pp. 710–733 (Australian species).
Andrewes 1929, Fauna British India etc., Coleop., Carabidae **1**, pp. 344, 351–381.
Kult 1947, Acta Soc. Ent. Czechoslovakia **44**, p. 32 (subgenera).
—— 1951, Acta Soc. Ent. Czechoslovakia **48**, pp. 16–32 (the Oriental species).
(Selected references only)

Diagnosis and *description.* See preceding references and key to genera.

Genotype. Tenebrio fossor Linnaeus, of Europe.

Generic distribution. Almost cosmopolitan; many species on all continents, but few or none in cold places where (in the north) the genus tends to be replaced by *Dyschirius.*

Notes. Both Oriental and Australian groups of this genus are represented in New Guinea, but the exact relationships of some of the species are doubtful.

I have made a special comparison of the *Clivina* of Cape York (where I collected long series in 1958) with those of New Guinea. A few species (*zebi, basalis, sellata, ferruginea, inopaca*) in the two places seem to be the same, but most are different. Some of the species of this genus, especially those in

the last few couplets of the following key, are difficult to separate from each other and may now be in process of evolutionary radiation.

Most *Clivina* live in the ground in wet places, but each prefers a special niche within this general habitat (damp soil in rain forest, or mud by standing water, or sandy river banks, etc.). In Australia some species of the genus have entered deserts, and in the Philippines one occurs in decaying logs. Most species are winged and many fly to light, but the wings of a few have atrophied. Wing atrophy has in fact occurred in three separate stocks of the genus in New Guinea (see *toxopei, deälata,* and *crugatella*).

Species of Clivina previously described from New Guinea but not recognized from description

Clivina guineensis Kult

Kult 1951, Acta Soc. Ent. Czechoslovakia **48**, pp. 29, 30.

Type. From Astrolabe Bay, **N-E. N. G.** (from Staudinger, in Kult Coll.).

Notes. A rather small red species which may (or may not) be similar to *rufulus* (below); the brief description suggests significant differences.

Clivina schaubergeri Kult

Kult 1951, Acta Soc. Ent. Czechoslovakia **48**, pp. 29, 30.

Type. From "Fly River," **New Guinea** (Kult Coll.).

Notes. A black, shining, 8.5 mm. member of the *ephippiata* group characterized otherwise only by "head without neck constriction; intervals moderately convex, striae finely punctate, third stria with 4 little distinct pores" and especially by "antennal joints 1.5X longer than wide." I do not think this species is represented in the material before me.

These 2 species are not included in the following key.

Key to Known Species of Clivina of New Guinea

1. Anal (last ventral) segment with the 2 seta-bearing punctures on each side close together (fig. 18) 2
— Anal segment with the 2 seta-bearing punctures on each side widely separated (fig. 19) 3
2. Middle tibia with very short spur (fig. 20) (*tranquebarica* group) (p. 362) ..... *zebi*

— Middle tibia with longer spur; (anterior puncture of 3rd elytral interval displaced, near 2nd stria) (p. 362) ..... (*castanea*)

3. Very large (*c.* 14–18 mm.); (whole front coarsely, irregularly wrinkled) (p. 363) ..... *toxopei*

— Smaller (4–10 mm.) 4

4. Cylindrical, prothorax very elongate (L/W 1.23); legs and antennae very short and stout, intermediate antennal segments transverse (p. 364) ..... *brevicornis*

— Form only normally convex, or depressed 5

5. Labrum 6-setose (median seta lacking) 6

— Labrum 5- or 7-setose (median seta present) 7

6. Third elytral interval 4-punctate; (rather depressed; piceous or reddish; *c.* 5-6 mm.) (p. 365) ..... (*wallacei*)

— Third elytral interval 3-punctate; (black, appendages ferruginous; 5.3 mm.) (*komáreki* Kult, if labrum 6-setose; see also couple 9) ..... *komáreki*

7. Labrum 5-setose 8

— Labrum 7-setose 10

8. Large (*c.* 8.5-10 mm.); 3rd elytral interval 4-punctate (p. 366) ..... *kulti*

— Smaller (*c.* 6 mm.); 3rd elytral interval 3-punctate 9

9. Frontal (preocular) plates with outer margins normal, oblique anteriorly (fig. 10); neck constriction shallow or interrupted at middle; anterior transverse groove of pronotum normal (p. 368) ..... *biroi*

— Frontal plates broader, rounded (fig. 11); neck constriction entire, deeper, more sharply defined; anterior transverse impression of pronotum very deep (p. 369) ..... *komáreki*

10. Clypeus with wings separated from median part by at least slight notches (figs. 13, 14); elytron usually with 4 striae free at base, except in *deälata* 11

— Clypeus with wings not separated from median part by notches (figs. 15–17) (but wings in some cases advanced and forming obtuse angles with median part); (elytron usually with 3 striae free at base, but 4th stria sometimes free in *rufula, tripuncta, erugata, subfusa,* etc.) 14

11. Spur of middle tibia (fig. 24) very long, longer than tibial width; (anterior trochanter with a small acute tooth at apex, on lower edge of leg; front with rather coarse, scattered punctures at least anteriorly) 12

— Spur of middle tibia not longer than tibial width 13

12. Fully winged; elytron usually with 4 striae free at base; larger (5.8–6.5 mm.); usually black (p. 370) ..... *puncticeps*

— Inner wings full or vestigial; elytron with 3 or 4 striae free at base; smaller (4.5–5.4 mm.); brown or partly brown ..... *deälata*

(a) Fully winged (Fly River) (p. 373) ..... (subsp. *antecessor*)

(b) Wings vestigial, vestiges about ½ length of elytra; (Papua) (p. 372) ..... (*deälata sensu stricto*)

(c) Wings vestigial, vestiges shorter, scarcely reaching beyond posterior edge of metathorax; (Neth. N. G., N-E. N. G.) (p. 373) (subsp. *brachyptera*)

13. Eyes large, genae very short (fig. 14); anterior transverse groove of pronotum normally impressed (p. 374) *vigil*
— Eyes smaller; genae (measured obliquely from sides of neck to posterior edges of eyes) nearly as long as eyes; anterior pronotal groove obsolete (its place taken by an irregular line of dark pigment under the surface of the pronotum) (p. 375) *deleta*
14. Third intervals of elytra 3-punctate 15
— Third intervals 4-punctate (*australasiae-ephippiata* group) 16
15. Rather depressed; rufous; front not impressed and not punctate (p. 377) *rufula*
— Less depressed; usually blackish with elytral margin ± pale; front vaguely impressed, usually punctate (p. 378) *tripuncta*
16. Supraocular convexities (frontal carinae) smoothly continuous with swollen preocular plates (but if form is parallel-sided and ratio width elytra/prothorax less than 1.10 and abdomen *conspicuously* punctate, see *gressitti*, couplet 19) 17
— Supraocular convexities ± interrupted (impressed or abruptly narrowed) near anterior supraocular setae 18
17. Smaller (*c.* 5–6 mm.), broader, slightly flatter (p. 380) *erugatella*
— Larger (*c.* 6–8 mm.), narrower, slightly more convex (p. 382) *erugata*
18. Spur of middle tibia (figs. 32, 36) short, very near apex of tibia 19
— Spur of middle tibia always longer and usually not so near tibial apex 20
19. Subfusiform; ratio width elytra/prothorax *c.* 1.25; length over 6.5 mm. (p. 384) *subfusa*
— Very parallel sided; width elytra/prothorax less than 1.10; length under 6 mm. (p. 385) *gressitti*
20. Bicolored, black with anterior part of elytra red (p. 383) *basalis*
— Not thus bicolored 21
21. Very small (4 mm.); (brown) (p. 387) *sellata*
— Larger 22
22. Anterior trochanter with a small acute tooth at apex, on lower side of leg, *and* color brown, *and* length under 6 mm. (p. 387) *ferruginea*
— Anterior trochanter usually not toothed, or if toothed, other characters not as above 23
23. Front femur (fig. 38) less stout; spur of middle tibia (fig. 33) near tibial apex (p. 388) *fessa*
— Front femur stouter (fig. 39); spur of middle tibia (figs. 34, 35) not so near apex 24
24. Last ventral segment punctate (p. 389) *sansapor*
— Last ventral segment with reticulate microsculpture but usually not punctate 25
25. Elytral disc not dull 26
— Elytral disc dull (with reticulate microsculpture) 28

26. More slender, prothorax considerably longer than wide (L/W 1.09) (p. 390) . . . . . *csikii*
— Less slender, prothorax about as long as wide (between L/W 1.04 & W/L 1.03) 27
27. Middle of front conspicuously (but variably) punctate (p. 393) *brandti*
— Front not or only slightly punctate (p. 392) . . . . . *inopaca*
28. Black; elytral striae more distinctly punctate; intervals more convex, 3rd with the 4 dorsal punctures less distinct (p. 395) . . . . . *székessyi*
— More brownish, antennae and legs more reddish; elytral striae less distinctly punctate; intervals less convex, 3rd with the 4 discal punctures more distinct (p. 396) . . . . . *netolitzkyi*

Clivina zebi Kult

Kult 1951, Acta Soc. Ent. Czechoslovakia **48**, pp. 22, 24.

Description (recognition characters only). This is the only member of the Oriental *Clivina tranquebarica* group known to reach New Guinea. It is distinguished from other New Guinean *Clivina* by characters given in the key.

Type. The type is from Borneo, in Dr. Kult's collection.

Occurrence in New Guinea. **Papua**: 13, Dobodura, Mar.-July 1944 (Darlington). **Neth. N. G.**: 10, Hollandia, July-Sept. 1944 (Darlington); 1, same locality, May 1945 (H. Hoogstraal, M.C.Z.); 2, Maffin Bay, Aug. 1944 (Darlington). The species occurs chiefly, I think, in shaded swamps.

Notes. Clivina zebi ranges from **Sumatra** to the **Philippines** and **New Guinea**; I have seen 4 specimens also from Cape Gloucester, **New Britain**; and in 1958 I found it common at several localities on the Cape York Peninsula, **Australia**. I do not think it has received a name in Australia.

(Clivina castanea Westwood)

Westwood 1837, Proc. Zool. Soc. London **1837**, p. 128.

Andrewes 1929, Fauna British India etc., Coleop., Carabidae **1**, pp. 355, 374, fig. 54.

Clivina parryi Putzeys 1863, Mem. Soc. R. Sci. Liege **18**, p. 60.

(Selected references and synonymy only)

Description. A rather large, black *Clivina,* characterized in the key (above).

Type. The type of *castanea*, from Manila in the Philippines, is now in British Mus. The types of *parryi* were supposed to be from New Guinea, but it is doubtful if they really came from there. They should be in Brussels Mus.

Occurrence in New Guinea. I know no recent records; the old ones are doubtful.

Notes. Although this Oriental species is commonly said to extend to New Guinea, the supposed New Guinean specimens are old and of unstated history. They may have been collected by Wallace; if so, their real locality is doubtful. *Clivina castanea* is usually a very common species where it occurs. Its absence from all recent collections seen from New Guinea suggests that it does not really occur there.

Clivina toxopei n. sp.

Description. Form as figured (fig. 4); very large (in genus); black, appendages dark; moderately shining, pronotum and elytra with fine reticulate microsculpture distinct in type but less distinct or partly absent in paratype. *Head* (fig. 8) .72 and .68 width prothorax (in type and paratype); eyes small but convex, enclosed behind by genae; antennae short, median segments slightly wider than long, normally pubescent; mandibles short and stout; labrum 7-setose; clypeus subtruncate at middle, wings continuous with median part but more advanced, separated from preocular lobes by notches; facial carinae short and poorly defined; frontal foveae very deep, irregular; whole front of head coarsely and irregularly wrinkled, not punctate but sometimes vaguely punctulate; neck constriction entire or nearly so, not punctate. *Prothorax* exactly as long as wide by standard measurement but appearing slightly longer (because anterior angles are more advanced than front of prothorax at middle), widest near basal angles, strongly narrowed anteriorly; apex broadly emarginate; anterior angles very narrowly rounded, almost right; posterior angles obtuse-rounded, not distinctly dentate; sides almost straight (slightly arcuate), finely margined, each with usual 2 setae; disc with median line and anterior transverse impression entire, impressed, not punctate; surface of disc variably wrinkled or strigulose, not punctate but inconspicuously punctulate, with an irregular longitudinal impressed line on each side distinct in type but vague in paratype. *Elytra* elongate-oval, slightly wider than prothorax (E/P 1.1 in both specimens); base slightly emarginate; humeri slightly prominent anteriorly but broadly rounded into sides, not dentate; each elytron with 3 striae free at base, the 4th turning out and joining or almost joining outer striae at humerus;

striae entire, deeply impressed, punctate in type, not in paratype; intervals convex, 3rd 4-punctate on outer side. *Inner wings* atrophied; elytra locked together or connate. *Lower surface:* prosternal process wide and flat before coxae; proepisterna shining, only partly and lightly microretieulate; lateral cavities of peduncle reticulate and more or less wrinkled; metepisterna shortened, about ½ longer than wide (judged by eye — I do not want to set standards of measurement); abdomen with fine reticulate microsculpture, impunctate; apical segment with 2 seta-bearing punctures on each side widely separated. *Legs* normal, not stouter than usual; front tibia 3-dentate, the 4th (upper) tooth reduced to an inconspicuous angulation; middle tibia (fig. 21) with spur on outer side near apex about as long as width of tibia. *Measurements* (type and paratype): length *c.* 18 and 14.5; width *c.* 4.8 and 4.1 mm.

Types. Holotype ♀ (Leiden Mus.) from Sigi Camp, Snow Mountains, **Neth. N. G.**, 1,500 m. (*c.* 4,650 ft.), Feb. 1939 (L. J. Toxopeus); and 1 ♀ paratype (M.C.Z. No. 30,153) from Araucaria Camp, also in the Snow Mountains, 800 m. (*c.* 2,480 ft.), March 1939 (Toxopeus).

Measured specimens. The types.

Occurrence in New Guinea. Known only from the types.

Notes. This very large *Clivina* has no known close relatives in New Guinea. It resembles and may be related to certain Australian species of Sloane's *procera* group, but differs from the Australian ones known to me in the strong wrinkling of the front of the head. The occurrence of this specialized (flightless) species in the Snow Mts. suggests that other species derived from the same (Australian) ancestral stock will eventually be found elsewhere in the mountains of New Guinea.

Clivina brevicornis n. sp.

Description. Cylindrical; brownish piceous, appendages paler; moderately shining, pronotum and elytra without (or with indistinct) reticulate microsculpture. *Head* (fig. 12) .80 width prothorax; eyes small but rather prominent; genae short, almost forming right angles with neck; antennae very short, median segments transverse, normally pubescent; mandibles normal, short, curved; labrum 7-setose; clypeus broadly emarginate, with wings continuous with median part, separated from preocular lobes by moderate notches; clypeal suture irregularly impressed; facial carinae short; front irregularly wrinkled and

with median fovea, slightly and irregularly punctate; neck wide, not impressed above. *Prothorax* much longer than wide (L/W 1.23), widest near base, but not much narrowed anteriorly; sides sinuate or broadly emarginate in outline before middle; anterior angles rounded, not produced; posterior angles broadly rounded, not dentate; lateral margins reaching basal margin; disc with median line and anterior transverse line entire, normally impressed; surface scarcely strigulose, almost impunctate except for an inconspicuous linear group of punctures on each side near base, but surface of disc abraded anteriorly or possibly with some reticulate microsculpture. *Elytra* cylindrical, scarcely wider than prothorax (E/P 1.05); base nearly truncate; humeri rather narrowly rounded, not dentate; sides subparallel, faintly, broadly sinuate about ⅓ from base; striae impressed, punctate, the first 4 free at base; intervals moderately convex, 8th carinate at base, 3rd inconspicuously 4-punctate, the punctures almost lost against the punctate 3rd stria. *Inner wings* fully developed. *Lower surface:* prosternal process narrow before anterior coxae; proepisterna reticulate but not distinctly punctate; abdomen reticulate basally especially at sides, shining apically, impunctate; last ventral with 2 setae on each side widely separated. *Legs* short; front tibia 3-dentate, the 4th (upper) tooth missing; middle tibia (fig. 22) with spur about ⅓ from apex and about as long as width of tibia. *Measurements:* length *c.* 4.3; width between 1.0 and 1.1 mm.

Type. Holotype (M.C.Z. Type No. 30,154), sex not determined, from Dobodura, **Papua**, New Guinea, Mar.-July 1944 (Darlington).

Occurrence in New Guinea. Known only from the type.

Measured specimen. The type.

Notes. This new species is similar to and probably related to *Clivina bullata* Andrewes, of which I have seen the type, from Timor, in the British Museum. However, the present new species is smaller, with sides of prothorax more sinuate before middle, and with front of head much less strongly sculptured than in *bullata,* though on the same pattern.

(Clivina wallacei Putzeys)

Clivina castanea Putzeys 1863, Mem. Soc. R. Sci. Liege **18**, p. 35 (part) (not *castanea* Westw.)

Clivina westwoodi Putzeys 1866, Ann. Soc. Ent. Belgique **10**, p. 109 (part) Andrewes 1926, Ann. Mag. Nat. Hist. (9) **17**, p. 373.

Clivina wallacei Putzeys 1866, Ann. Soc. Ent. Belgique **10**, p. 127.
Andrewes 1926, Ann. Mag. Nat. Hist. (9) **17**, pp. 373, 374.
—— 1929, Ann. Mag. Nat. Hist. (10) **4**, p. 355.
(Selected references only)

Description. Sufficiently characterized in preceding key to species of *Clivina*.

Types. The (supposedly) new Guinean cotype of *castanea* Putzeys (*westwoodi* Putzeys) is in the Putzeys Collection, Brussels Mus., where Andrewes examined it. Of *wallacei*, Andrewes (1929, p. 355) records seeing 2 specimens, "including the type," also in the Putzeys Collection, Brussels; he gives the type locality as **New Guinea**, but Putzeys says the specimens are from **Celebes**, which I think is probably correct (see below).

Occurrence in New Guinea. The only records are old and doubtful (see below).

Notes. Putzeys originally described his *castanea* as from Ceylon and New Guinea, and renamed it *westwoodi* when he found that *castanea* was preoccupied. Andrewes, finding that Putzeys' original specimens represented two species, applied the name *westwoodi* to the one from Ceylon. In the meantime Putzeys had described *wallacei* (without noting its resemblance to his *westwoodi*) from specimens from "Makassar (Celebes)" and "Dorey (Celebes)," and Andrewes, after examination of Putzeys' types, has applied the name to the present species. "Dorey (Celebes)" is a jumbled locality, for Dorey is really in New Guinea. However, the "Dorey" label is always to be doubted (see introduction, p. 331). I know of no recent material of this species from New Guinea, and I suspect that all the old New Guinea records are based on mislabeled specimens collected by Wallace probably on Celebes.

Clivina kulti n. sp.

Description. Form as figured (fig. 5); large; a little broader than usual in genus, but slightly narrowed anteriorly, slightly flatter above than usual; black, appendages brownish; shining, most of upper surface without reticulate microsculpture. *Head* (fig. 9) .69 and .70 width prothorax (in measured specimens); eyes prominent, genae short, almost forming right angles with sides of neck; antennae normal, median segments about as long as wide, normally pubescent; mandibles short, curved; labrum 5-setose (in all specimens); clypeus truncate at middle, clypeal

wings continuous with median part but strongly advanced, separated from preocular lobes by slight notches; elypeal suture not visible; supraocular convexities continuous with preocular lobes, separated from front by deep sulci which extend from neck constriction to base of elypeus, becoming deeper and sinuous anteriorly; front slightly, almost evenly convex, impunctate; neck constriction interrupted at middle, slightly punctate at sides. *Prothorax* slightly wider than long (W/L 1.10 and 1.13), widest not far before posterior angles, rather strongly narrowed anteriorly; sides nearly straight and converging in about anterior half; apex emarginate; anterior angles narrowly rounded, subrectangular; posterior angles obtuse-rounded, not dentate; disc rather flat, with lightly impressed middle line and anterior transverse impression; surface of disc slightly strigulose, virtually impunctate. *Elytra* 1.14 and 1.12 width prothorax; base broadly emarginate; humeri rounded, not dentate; each elytron with usually 4 striae free at base, rarely only 3 (base of 4th stria sometimes turned out, rarely joining base of 5th — holotype has only 3 striae free on left elytron, 4 on right); striae moderately impressed, entire, usually faintly punctulate; intervals slightly convex, 3rd 4-punctate (on both elytra of all individuals except right elytron of type only 3-punctate). *Inner wings* fully developed. *Lower surface:* prosternal process rather wide before coxae, weakly longitudinally impressed; proepisterna roughened but rather shining; abdomen microreticulate, almost impunctate except apical segment rugose-punctate at sides; 2 seta-bearing punctures on each side apical segment far apart. *Legs* rather slender (in genus); front tibia 3-dentate; middle tibia (fig. 25) with spur on outer side near apex not quite as long as width of tibia. *Measurements:* length *c.* 8.5-10.4; width *c.* 2.6-3.0 mm.

Types. Holotype ♂ (M.C.Z. No. 30,155) and 7 paratypes all from Aitape, **N-E. N. G.**, Aug. 1944 (Darlington), taken in flood debris in forest or recently forested areas.

Occurrence in New Guinea. Known only from the type locality.

Measured specimens. The ♂ holotype and 1 (sex not det.) paratype.

Notes. This well defined species is sufficiently characterized in the key (above).

Clivina biroi Kult

Kult 1951, Acta Soc. Ent. Czechoslovakia **48**, pp. 28, 30.

Description. Medium sized, moderately broad, subparallel, moderately convex; black, appendages irregularly dark brown, antennae paler; shining, upper surface almost entirely without reticulate microsculpture. *Head* (fig. 10) .71, .71, .71 width prothorax (in measured specimens); eyes prominent, genae short, almost forming right angles with sides of neck; antennae normal, median segments as wide as or slightly wider than long; mandibles short; labrum 5-setose (in all specimens); clypeus broadly emarginate, with wings continuous with median part and somewhat advanced, separated from preocular lobes by notches; preocular lobes with outer edges oblique, nearly straight and strongly converging in about anterior ⅔; clypeal suture indistinct; supraocular convexities nearly continuous with swollen preocular lobes, separated from front by subparallel, irregular sulci, which become wider and strongly sinuous anteriorly; front slightly, almost evenly convex or with a slight V-shaped impression anteriorly, with a group of punctures near middle anteriorly; neck constriction shallow, narrowly interrupted at middle, slightly punctate toward sides. *Prothorax* about as long as wide (L/W 1.02, 1.03, 1.03), nearly quadrate, slightly narrowed anteriorly; sides vaguely sinuate about anterior ⅓; apex almost truncate, faintly emarginate; anterior angles almost right, narrowly rounded, not advanced; posterior angles obtuse, not or vaguely dentate; lateral margins entire, each with usual 2 setae, near basal angle and about ⅙ of prothoracic length from apex; disc rather convex, with usual impressed middle line and anterior transverse impression, with surface slightly, irregularly strigulose, not distinctly punctate. *Elytra* slightly wider than prothorax (E/P 1.08, 1.04, 1.05), rather short (in genus); base almost truncate; humeri rounded, not dentate; each elytron with 3 or 4 striae free at base; striae rather deeply impressed, entire, finely punctate; intervals rather convex, 7th and 8th joined near base where narrow and convex but scarcely carinate, 3rd 3-punctate in all specimens. *Inner wings* fully developed. *Lower surface:* prosternal process average (neither very broad nor very narrow) before coxae; proepisterna with light reticulate microsculpture externally, shining and vaguely punctate internally; abdomen with reticulate microsculpture only at base, shining in last 3 or 4 segments, punctate especially near sides of last 4 segments, and with last segment wholly punctate in

some individuals; 2 seta-bearing punctures each side last ventral segment far apart. *Legs* rather stout; front tibia 3-dentate; middle tibia (fig. 23) with spur near apex nearly as long as width of tibia. *Measurements:* length 5.4–6.4; width 1.5–1.8 mm. (Kult gives length as 5.9–6.8 mm.).

Types. Holotype ♀ from Sattelberg, **N-E. N. G.** (Biró, Hungarian National Mus.) and 1 ♀ paratype from Madang, **N-E. N. G.** (Kult collection). I am indebted to Dr. Z. Kaszab for an opportunity to examine the type.

Occurrence in New Guinea. **Papua:** 19, Dobodura, Mar.-July 1944 (Darlington); 1, Milne Bay, Dec. 1943 (Darlington). **N-E. N. G.:** 13, Aitape, Aug. 1944 (Darlington); 1, Nadzab, July 1944 (Darlington); 3, Chimbu Valley, Bismarck Range, 5000-7500 ft., Oct. 1944 (Darlington); 1, Adelbert Mts.: Wanuma, 800–1000 m. (*c.* 2600–3250 ft.), Oct. 23, 1958 (J. L. Gressitt, Bishop Mus.) taken in light trap. **Neth. N. G.:** 1, Maffin Bay, Aug. 1944 (Darlington). The species usually occurs in shaded swamps.

Measured specimens. The ♀ type and a pair (♂ ♀) from Dobodura, listed in this order.

Notes. Sufficiently compared with other species in the key to species of *Clivina*.

The type of *biroi* has the whole last ventral segment closely punctate, while most individuals of the species have the last ventral nearly smooth at middle, but at least one specimen from Dobodura has it closely punctate, showing that the character varies individually. The type has only 3 striae free at base of each elytron, and this is the case also in the Nadzab, Maffin Bay, and most Aitape individuals, but one from Aitape has the 4th striae more or less free too, as it is in specimens from Chimbu Valley, Dobodura, and Milne Bay. This is an example of partly individual and partly geographical variation in a character sometimes considered very important in classification.

Clivina komáreki Kult

Kult 1951 Acta Soc. Ent. Czechoslovakia **48**, pp. 18, 31.

Description (significant characters only). A medium-sized black *Clivina*, characterized by unusually wide, strongly arcuate frontal plates (fig. 11) and unusually deep anterior transverse impression of pronotum, and by other characters given by Kult and in the key to species of *Clivina*.

Type. From "Gulf of Papua," **Papua**, in Dr. Kult's collection.

Occurrence in New Guinea. **Papua**: the type. **Neth. N. G.**: 1, Hollandia, Nov. 1944 (H. Hoogstraal, M.C.Z.).

Notes. My single specimen of this strongly defined species fits the description of *komárcki* reasonably well in most ways, except that the labrum, described as 6-setose in *komáreki* by Kult, is only 5-setose. My specimen is in good condition, and the 5 labral setae are clearly visible and symmetrically placed. This difference (if in fact there is a difference) is not necessarily important; the number of labral setae varies in some other species. The proportions of the Hollandia specimen are: head .77 width prothorax; prothoracic width/length 1.06; width elytra/-prothorax 1.12. *Measurements:* length *c.* 5.8, width *c.* 1.7 mm. These figures are close to those given by Kult for the type. Kult recognized no close relatives of this species. However, it is probably related to and possibly derived from *Clivina biroi* (above), which has the same general form and group characters without the more striking special characters of *komárcki*.

Clivina puncticeps n. sp.

Description. Form as figured (fig. 6); rather slender, subparallel, moderately convex; black or dark brown, margins of elytra sometimes paler, appendages dark brown or rufous; shining, upper surface (except at sides) almost without reticulate microsculpture. *Head* (fig. 13) .75 and .75 width prothorax (in measured specimens); eyes prominent but smaller than usual; genae oblique or rounded-oblique, as long as or not much shorter than eyes; antennae normal, intermediate segments about as wide or slightly wider than long; mandibles short; labrum usually 7-setose, individually 6-setose (e.g. an example from Aitape has an intermediate seta missing on the right side); clypeus truncate or slightly emarginate, separated from wings by moderate notches; clypeal wings prominent, narrowly rounded, separated from preocular lobes by deep notches; clypeal suture obsolete; supraocular convexities narrow, almost cariniform, separated from swollen preocular lobes; frontal sulci widely separated, slightly diverging anteriorly and posteriorly; clypeus with transverse swollen area or transversely wrinkled; front irregularly convex, slightly impressed at middle, irregularly in part rather coarsely punctate; neck constriction slightly impressed

and punctate at sides, usually (not always) interrupted at middle. *Prothorax* subquadrate, slightly longer than wide, length/width 1.06 and 1.09, only slightly narrowed anteriorly; sides usually subsinuate before middle, slightly arcuate in front of and behind the sinuation; lateral margins entire, each with usual 2 setae; anterior margin broadly emarginate; anterior angles rather narrowly rounded, scarcely advanced; posterior angles weakly dentate; pronotum with usual anterior transverse impression and longitudinal median line, with a few irregular transverse strigae, and finely, irregularly, inconspicuously punctulate. *Elytra* slightly wider than prothorax (measurement of width impossible because left elytron of all specimens raised to show inner wings), long, subparallel; base subtruncate-emarginate, with small tubercles at front ends of 2nd and usually 3rd intervals; humeri rather narrowly rounded; 3 or 4 inner striae of each elytron free at base (individual variation); striae entire or nearly so, well impressed, distinctly punctate; intervals moderately convex, 8th finely carinate at base, 3rd 4-punctate on outer edge, intervals otherwise scarcely visibly punctate. *Inner wings* fully developed in all specimens. *Lower surface:* proepisterna rugose; abdomen rugose or punctate at sides and across almost whole apical segment; 2 apical setae on each side widely separated. *Legs:* anterior tibia strongly 4-dentate (but upper tooth sometimes reduced); anterior trochanter (of all specimens) with a small *acute* tooth at apex, on lower edge of leg; middle tibia (fig. 24) with a long spur (longer than width of tibia) on outer side about one third from apex. *Measurements:* length 5.8–6.5; width *c.* 1.5 mm. (width not measured exactly because of raising of elytra).

Types. Holotype ♂ (M.C.Z. Type No. 30,156) and 13 paratypes from vicinity of Hollandia, **Neth. N. G.**, July-Sept. 1944 (Darlington), and 1 additional paratype from same locality, Apr. 1945 (Malkin, U.S.N.M.). Additional paratypes: 2, Aitape, **N-E. N. G.**, Aug. 1944 (Darlington), and 1, Idenburg R., **Neth. N. G.**, 400 m. (about 1,300 ft.) July 15-Sept. 15, 1938 (J. Olthof, Leiden Mus.). My specimens were taken from damp soil but not in very wet places.

Other material. One additional specimen, not a type, from Hollandia (Darlington), with front of head abnormally flattened and wrinkled. Also 1 from Dobodura, **Papua**, Mar.-July 1944 (Darlington) that I refer here with doubt: the front is flatter than in typical *punticeps* and seems at first impunctate,

but vague shallow punctures can be seen on careful examination, and the insect is browner (less black) and perhaps slightly more depressed than typical *punticeps,* but otherwise nearly the same. I do not know whether it is an aberrant *punticeps* or a different, perhaps geographical form.

Measured specimens. The holotype and one paratype from Hollandia.

Notes. A very distinct species, placed in relation to others in the key to species of *Clivina.*

Clivina dealata n. sp.

Description. Form slender, subparallel, moderately convex; brownish or reddish with disc of elytra sometimes darker; shining, upper surface (except at sides) with reticulate microsculpture faint (on front) or absent, (except in subsp. *antecessor, q. v.*), but head in part coarsely and pronotum finely punctate. *Head* .74 and .75 width prothorax; eyes rather small, about as long as (oblique) genae; antennae normal, intermediate segments about as wide as long; mandibles short; labrum 7-setose; clypeus truncate, middle part usually (not always) separated from wings by slight notches, with wings narrowly rounded, separated from preocular plates by deeper notches; clypeal suture obsolete; supraocular convexities almost cariniform, separated from swollen preocular plates; frontal sulci widely separated, subparallel, somewhat irregular; clypeus transversely swollen; front convex, not or irregularly and faintly impressed, sometimes with a slight impression at middle, coarsely but variably punctate; neck constriction not much impressed, punctate especially at sides, usually interrupted at middle. *Prothorax* subquadrate, about as long as wide, length/width .97 and .99, slightly narrowed anteriorly; sides nearly straight, slightly converging anteriorly with entire margins and usual setae; anterior margin slightly emarginate; anterior angles narrowly rounded, scarcely prominent; posterior angles with distinct blunt teeth; pronotum with usual impressed lines and finely, inconspicuously punctate, with a more impressed line of coarser punctures on each side behind middle. *Elytra* slightly wider than prothorax, slightly shorter and more oval than in preceding species but otherwise similar, with 3 or 4 striae free at base. *Inner wings* strongly reduced, about half as long as elytra (but sometimes crumpled). *Lower surface* rugose and punctate about as in preceding species, with similar widely spaced apical ventral setae.

Legs as in preceding species, with similar acute teeth at tips of anterior trochanters. *Measurements:* length 4.3–5.2; width *c.* 1.3–1.4 mm.

Types. Holotype ♂ (M.C.Z. No. 30,157) and 15 paratypes from Dobodura, **Papua**, Mar.-July 1944 (Darlington), taken in damp soil but not in very wet places.

Other material. Known only from the types, but the following subspecies represent the species elsewhere in New Guinea.

Measured specimens. The ♂ holotype and 1 ♀ paratype.

Notes. This new species is evidently related to and perhaps derived from the preceding one (*punticeps*) as shown by many characters including the toothed anterior trochanters. I think, however, that it is a distinct species. Besides having reduced wings, it is smaller and (as shown by the prothoracic proportions) relatively shorter than *punticeps* and paler in color. A subspecies of *deälata* (below) occurs with *punticeps* at Hollandia without intergrading.

Clivina deälata brachyptera n. subsp.

Description. Form as figured (fig. 7); nearly the same as typical *deälata* but with uniformly shorter wing vestiges, which scarcely extend beyond the posterior edge of the metasternum and which are only a small fraction as long as the elytra. Proportions of measured specimens are head .74 and .71 width prothorax; length/width prothorax 1.03 and 1.03; relative width elytra not measured because left elytron of all specimens raised to show inner wings. *Measurements:* Length 4.5–5.4; width *c.* 1.4 mm.

Types. Holotype ♂ (M.C.Z. 30,158) and 21 paratypes from Hollandia, **Neth. N. G.**, July-Sept. 1944 (Darlington).

Other material. Six specimens from Aitape, **N-E. N. G.**, Aug. 1944 (Darlington), and 38 from Maffin Bay, **Neth. N. G.**, Aug. 1944 (Darlington and E. S. Ross, California Acad.) are referred to this subspecies, but not as types.

Measured specimens. The ♂ holotype and 1 paratype.

Notes. See under preceding and following subspecies.

Clivina deälata antecessor n. subsp.

Description. Essentially the same as typical *deälata* and subspecies *brachyptera* but with inner wings fully developed, eyes a little larger, and elytra with reticulate microsculpture (with

meshes either slightly longitudinal or imperfect). Color of all specimens piceous with suture and sides of elytra as well as appendages reddish brown. Proportions: head .72 and .75 width prothorax; prothoracic width/length 1.05 and 1.03; width elytra/prothorax *c.* 1.17 and 1.21. *Measurements:* length 5.0–5.5; width 1.5–1.6 mm.

Types. Holotype (sex not determined) (Bishop Mus.) and 3 paratypes all from Kiunga, Fly R. **Papua**, Sept. 24-25 (holotype) and Aug. 1–3, 8–10, 11–13, 1957 (W. W. Brandt). One paratype now in M.C.Z. (No. 30,306).

Measured specimens. The holotype and 1 paratype.

Notes. These specimens were received after the descriptions of *deälata* and *brachyptera* had been drawn. They appear to represent the winged population from which the short-winged subspecies have been derived.

Clivina vigil n. sp.

Description. Subparallel, rather depressed (in genus); rufous, shining, head and discs of pronotum and elytra without reticulate microsculpture (which, however, is present laterally). *Head* (fig. 14) .78 and .81 width prothorax; eyes large and prominent (in genus), genae very short, forming (blunt) right angles with neck; antennae normal, intermediate segments about as long as wide; mandibles short, normal; labrum 7-setose; clypeus typically subtruncate but with angles advanced and dentiform in Nadzab example, middle part separated from wings by shallow, obtuse notches (possibly variable); clypeal wings small, arcuate or subangulate, separated from preocular lobes by notches; clypeal suture obsolete; supraocular convexities cariniform, sharply separated from swollen preocular lobes; frontal sulci rather short, arcuate; front convex (sometimes irregularly so), slightly impressed at middle, rather finely and irregularly punctate; neck constriction typically impressed and punctate only at sides, widely interrupted at middle (but not interrupted in Nadzab example). *Prothorax* subquadrate, slightly wider than long (width/length 1.09 and 1.10), slightly narrowed anteriorly; sides slightly and almost evenly arcuate, with entire margins and usual 2 setae; front edge slightly emarginate; anterior angles rounded, not advanced; posterior angles with distinct but blunt teeth; basal marginal gutter wider and more rugose than usual; disc with usual anterior transverse line and median longitudinal line rather lightly impressed, and with

surface finely, sparsely, inconspicuously punctate. *Elytra* about ¼ wider than prothorax (E/P 1.26 and 1.29), subtruncate at base with rounded humeri; sides almost straight (faintly arcuate) to behind middle, margins crenulate behind humeri; each elytron with 4 striae free at base; striae entire or nearly so, moderately impressed, vaguely or not punctate; intervals slightly convex, 8th not carinate at humeri, 3rd 4-punctate, intervals otherwise not distinctly punctate. *Inner wings* fully developed. *Lower surface:* proepisterna roughened (deeply microreticulate) externally, more or less punctate internally; abdomen impunctate but with close reticulate microsculpture; last ventral segment with 2 setae on each side wide apart. *Legs:* front tibiae 3-dentate; middle tibiae (fig. 26) with spur on outer side near apex about as long as tibial width. *Measurements:* length *c.* 5.7–6.1; width *c.* 1.7–1.8 mm.

Types. Holotype ♀ (M.C.Z. No. 30,159) and 1 paratype from Dobodura, Papua, Mar.-July 1944 (Darlington). I do not know the habitat of this species.

Other material. One, Nadzab, Markham Valley, **N-E. N. G.**, Aug. 1944 (K. V. Krombein, U.S.N.M.), differing from the types as indicated in the preceding description.

Measured specimens: the holotype and paratype from Dobodura.

Notes. This species is sufficiently distinguished from other New Guinean species in the key above. It resembles and is probably related to *denticollis* Sloane of Australia (described from (NW?) Western Australia and represented in the M.C.Z. by specimens from the Burdekin River near Charters Towers, Queensland), but differs in detail, notably in the shallower clypeal notches and wider basal pronotal gutter of *vigil*.

Clivina deleta n. sp.

Description. Rather broad (in genus), depressed; rufous; shining, reticulate microsculpture faint on head, virtually absent on pronotum and elytra. *Head* .78 and .76 width prothorax; eyes smaller and less convex than in preceding species, genae oblique; antennae normal, median segments about as wide as long; mandibles short; labrum 7-setose; clypeus subtruncate or broadly emarginate, middle part usually (not always) separated from wings by slight notches; clypeal wings small, separated from preocular plates by deeper notches; clypeal suture usually not impressed, but front usually with one or two transverse

impressed lines which simulate a clypeal suture; supraocular convexities sharply separated from swollen preocular plates; frontal sulci deep, slightly diverging and almost reaching neck constriction posteriorly; front moderately convex but usually with irregular impressions or transverse impressed lines as noted above, not distinctly punctate; neck constriction shallow, punctate, sometimes interrupted at middle. *Prothorax* subquadrate, usually slightly narrowed anteriorly, width/length 1.00 and 1.00; sides very broadly arcuate, almost straight at middle, with usual entire margins, and each with usual 2 setae but with posterior one farther in from margin than usual; front of prothorax subtruncate or broadly emarginate, with anterior angles very narrowly rounded and only slightly advanced; posterior angles distinctly but obtusely dentate; pronotum with well impressed median line but with anterior transverse impression obsolete at least at middle (an irregular line of black pigment under the surface marks the usual position of the transverse impression so that it is necessary to look carefully to see that the impression itself is absent); surface of pronotum finely, irregularly, inconspicuously punctate. *Elytra* about ⅓ wider than prothorax (E/P 1.31 and 1.31), broadly emarginate in front with tubercles at ends of second and third intervals; humeri rounded, margins behind them almost straight to behind middle, slightly crenulate behind humeri; 4 striae on each elytron free at base; striae entire, vaguely punctate; intervals slightly convex, 7th briefly and inconspicuously carinate at base, 3rd 4-punctate on outer side, intervals vaguely or not punctulate. *Inner wings* fully developed. *Lower surface:* proepisterna rugose and sides of body posteriorly also more or less rugose or subpunctate; anal segment with usual 2 setae on each side widely separated. *Legs:* front tibia 4-dentate[1] middle tibia (fig. 27) with spur on outer side near apex not longer than tibial width. *Measurements:* length 4.5-5.5; width ±1.5 mm.

Types. Holotype ♂ (M.C.Z. No. 30,160) and 5 paratypes from Dobodura, **Papua**, Mar.-July 1944 (Darlington). I did not distinguish this species in the field and do not know its habits (see under following species).

Measured specimens. The ♂ holotype and 1 ♀ paratype.

Notes. Superficially this species resembles several other small,

[1] In one example the right front tibia is only 3-dentate, without trace of upper tooth, although the left front tibia is normally 4-dentate, with upper tooth small but distinct and with an apical seta.

depressed, reddish species found in New Guinea, but it differs from the others in (among other things) the partial deletion of the anterior transverse impressed line of the pronotum.

Clivina rufula n. sp.

Description. Subparallel, slightly depressed; rufous; shining, almost entire upper surface without reticulate microsculpture (but latter sometimes faintly visible on head). *Head* (fig. 15) .75 and .74 width prothorax; eyes rather prominent (but less so than in *vigil*), genae short; antennae normal, median segments about as long as wide; mandibles short; labrum 7-setose; clypeus subtruncate, very broadly emarginate, middle part continuous (or nearly so) with wings, which are rounded, separated from preocular lobes by usually obtuse notches; clypeal suture absent; supraocular convexities continuous with swollen preocular lobes; frontal sulci well impressed, irregular, diverging anteriorly and posteriorly; front almost evenly convex, sometimes vaguely impressed at middle, slightly or not punctate; neck constriction almost absent, slightly punctate at sides, widely interrupted at middle. *Prothorax* subquadrate, more or less narrowed anteriorly, width/length 1.02 and 1.06; sides very broadly and slightly arcuate, with entire margins each with usual 2 setae; prothorax anteriorly subtruncate, broadly emarginate; anterior angles very narrowly rounded, not or only slightly prominent; posterior angles subdentate; disc with usual impressed lines, surface finely and inconspicuously punctate. *Elytra* nearly ¼ wider than prothorax (E/P 1.24 and 1.22); emarginate anteriorly, each with a tubercle at base of 2nd interval; humeri rounded, sides behind them very broadly arcuate, almost straight at middle, slightly crenulate behind humeri; 3 or 4 striae free at base on each elytron; striae entire, moderately punctate; intervals moderately convex, 7th briefly and inconspicuously carinate at humeri, 3rd 3-punctate on outer edge; intervals faintly or not distinctly punctulate. *Inner wings* fully developed. *Lower surface:* sides of body slightly roughened or microreticulate, with sides of some ventral segments shallowly punctate; last ventral with 2 apical setae on each side wide apart. *Legs:* front tibia 3-dentate on outer side; middle tibia (fig. 28) with moderate spur on outer side near apex. *Measurements:* length 4.2-4.8; width *c.* 1.3-1.5 mm.

Types. Holotype ♂ (M.C.Z. No. 30,161) and 69 paratypes

all from Dobodura, Papua, Mar.-July 1944 (Darlington). According to my notes, small, depressed, rufous species of *Clivina*, including the present one, were found under stones and other cover by rivers, among grass roots in sand, and at light.

Measured specimens. The ♂ holotype and 1 ♀ paratype.

Notes. In form of clypeus and front this species approaches the *australasiae* group, but it differs from typical members of the group in having the 3rd elytral interval with 3 rather than 4 punctures.

Clivina tripuncta n. sp.

Description. Rather stout (in genus), normally convex; black or dark reddish brown, margins of elytra usually (narrowly or broadly) paler, and appendages paler brown; shining, microsculpture faint or absent on head, virtually absent on pronotum except at extreme base and on elytra except at sides and apex. *Head* .71 and .71 width prothorax; eyes prominent but not very large, genae oblique, antennae normal, median segments slightly wider than long; mandibles short; clypeus subtruncate, broadly emarginate, middle part not separated from wings, latter separated from preocular lobes by distinct notches; labrum 7-setose; supraocular convexities slightly or not separated from swollen preocular lobes; frontal sulci subparallel, irregular, slightly diverging anteriorly and posteriorly; clypeal suture not impressed; front convex, sometimes irregularly impressed, usually more or less punctate at middle; neck constriction impressed (and punctate) only at sides, usually widely interrupted at middle. *Prothorax* rather wide, slightly narrowed anteriorly, W/L 1.10 and 1.09; sides broadly, slightly arcuate except often subsinuate near middle, with entire margins each with usual 2 setae; prothorax broadly emarginate anteriorly, anterior angles very narrowly rounded but scarcely advanced; posterior angles subdentate; disc with usual impressed lines and also some scattered punctation of mixed (moderate and fine) punctures. *Elytra* rather short (in genus), about ⅕ wider than prothorax (E/P 1.21 and 1.20), slightly emarginate anteriorly, with tubercles at bases of 2nd and usually 3rd intervals; humeri rounded, sides behind them broadly arcuate except almost straight before middle, slightly crenulate at and behind humeri; each elytron with 3 or 4 striae free at base; striae well impressed, entire, rather finely punctate; intervals moderately convex, 7th not

distinctly carinate at humeri, 3rd 3-punctate on outer edge, intervals not distinctly punctate. *Inner wings* fully developed. *Lower surface:* procpisterna rugose-punctate; sides of abdomen finely rugose near base, subpunctate at sides of posterior segments, which are shining, almost without surface sculpture at middle; last ventral with 2 setae on each side wide apart. *Legs:* front tibia 4-dentate but upper tooth minute; middle tibia (fig. 29) with a short spur on outer side less than 1/4 from apex. *Measurements* (Dobodura series only): length 4.1-5.2; width *c.* 1.4-1.7 mm. (specimens from some other localities run larger).

Types. Holotype ♂ (M.C.Z. No. 30,162) and 37 paratypes from Dobodura, **Papua**, Mar.-July 1944 (Darlington).

Additional material. **Papua**: 14, Milne Bay, Aug. 1944 (Darlington); 2, Fly R. 5 mi. below Palmer R., May 1936, and 1, Palmer R. at Black R., June 1936 (Archbold Exp., A.M.N.H.). **N-E. N. G.**: 2, Torricelli Mts., Mobitei, 750 m. (*c.* 2450 ft.), Feb. 28-Mar. 4 and Mar. 5-15, 1959 (W. W. Brandt, Bishop Mus.); 1, Torricelli Mts., Mokai Village, 750 m. (*c.* 2450 ft.), Jan. 1-23, 1959 (W. W. Brandt, Bishop Mus.); 1, Adelbert Mts., Wanuma, 800-1000 m. (*c.* 2600-3250 ft.), Oct. 24, 1958 (J. L. Gressitt, Bishop Mus.); 1, Sambeang, 400 m. (about 1300 ft.), Mongi Watershed Huon Peninsula, Apr. 21, 1955 (E. O. Wilson, M.C.Z.); 21, Aitape, Aug. 1944 (Darlington). **Neth. N. G.**: 3, Hollandia, July-Sept. 1944 (Darlington), 3, same locality, May 1945 (H. Hoogstraal, M.C.Z.), and 1, same locality, Feb. 12, 1945 (Hoogstraal, Chicago Mus.); 1, Sabron, Cyclops Mts., Camp 1, 1,200 ft., May 15, and 1, same locality, Camp 2, 2,000 ft., July 1936 (Cheesman); 4, Maffin Bay, Aug. 1945 (Darlington), and 1, same locality, Oct. 1944 (K. V. Krombein, U.S.N.M.); 1, Fac Fac, June 1939 (Wind, M.C.Z.); 2, "Neth. New Guinea," Sept. 1944 (T. Aarons, California Acad.); 1, Camp 1, Mt. Nok, Waigeu Is., 2,500 ft., May 1938 (Cheesman). Of these, 1 of my Hollandia specimens and the single specimens from Fac Fac and Waigeu Is. have the 3rd intervals with 4 (not 3) punctures; 1 of my Hollandia specimens has the left elytron 3- and the right only 2-punctate; and the specimens from the Fly and Palmer R. and Sambeang, though 3-punctate, are larger than usual, about 6 mm. or a little longer. I refer these specimens to this species with some doubt. The species apparently occurs throughout New Guinea at low altitudes, usually, I think, in shaded swamps. I have a typical specimen also from Cape Gloucester, **New Britain**.

Measured specimens. The ♂ holotype and 1 ♀ paratype.

Notes. This somewhat variable species is further discussed and compared in "Notes" under the following species, *erugatella.*

Clivina erugatella n. sp.

Description. Rather stout, slightly depressed; black or piceous, sometimes with sides of elytra paler, legs rather dark brown, antennae paler brown; shining, reticulate microsculpture faint or absent on front, present at sides and base but indistinct on disc of pronotum, and usually absent or indistinct on main part of elytral disc but present on sides and apex of elytra and sometimes extending to part of disc. *Head* .63 and .67 width prothorax; eyes not large but rather prominent; genae rather short; antennae normal, median segments about as long as wide; mandibles short, labrum 7-setose; clypeus subtruncate except wings slightly advanced, middle part continuous with wings, latter separated from preocular lobes by shallow notches; clypeal suture absent; supraocular convexities smoothly continuous with swollen preocular lobes; frontal sulci subparallel, sinuous anteriorly; front varying from smoothly convex and continuous with clypeus to slightly irregularly impressed, sometimes with median impression, usually finely and inconspicuously punctulate, sometimes with a few coarser punctures; neck slightly impressed at sides, not at middle. *Prothorax* rather large, with pronotum rather depressed; width/length 1.09 and 1.13; somewhat narrowed anteriorly; broadly emarginate in front, anterior angles very narrowly rounded, almost angulate, not produced; posterior angles obtusely subangulate, subdentate; sides broadly and slightly arcuate, each with entire margin and usual 2 setae; disc with usual impressed lines, surface rather finely and inconspicuously punctulate. *Elytra* rather short (in genus), slightly wider than prothorax (E/P 1.14 and 1.16); slightly emarginate anteriorly, with tubercles at bases of first three intervals; each elytron with 3 striae free at base (in all specimens); striae entire, well impressed, finely punctate or subpunctate; intervals moderately convex, 7th briefly or not distinctly cariniform at base, third usually 4-punctate (see notes), surface of intervals not or indistinctly punctulate. *Inner wings* fully developed in type series, but reduced in some other specimens (see notes). *Lower surface:* proepisterna with isodiametric microsculpture (but not punctate) externally, rugose or punctate internally;

sides of posterior ventral segments not or lightly punctate; reticulate microsculpture visible but lightly impressed at middle of abdomen; apical ventral segment with usual 2 setae on each side wide apart. *Legs:* anterior tibia weakly 3-dentate; middle tibia (fig. 30) with a moderate spur on outer side near apex. *Measurements:* length 5.0-6.6; width 1.6-2.1 mm.

Types. Holotype ♂ (M.C.Z. No. 30,163) and 32 paratypes from Hollandia, **Neth. N. G.**, July-Sept. 1944 (Darlington).

Other material. **N-E. N. G.**: 36, Aitape, Aug. 1944 (Darlington). **Neth. N. G.**: 8, Maffin Bay, Aug. 1944 (Darlington), and 2, same locality, Aug. and Sept. 1944 (E. S. Ross, California Acad.).

Measured specimens. The ♂ holotype and 1 ♀ paratype.

Notes. Most individuals of this species have 4 punctures on the third interval of each elytron, but there are a few exceptions: one from Hollandia has only 3 punctures on each side; 2 specimens from Aitape have 5 punctures on one side, 4 on the other, and one has 4 on one side, 3 on the other; and one specimen from Maffin Bay has 4 on one side, 3 on the other. All specimens from Hollandia and Maffin Bay have the inner wings fully developed, but of the 36 from Aitape only 2 have fully developed wings and the other 34 have the wings reduced to about half the length of the elytra.

This species is very similar to the preceding one, *tripuncta*, but I feel sure they are different species, although no single character will distinguish every specimen. The numbr of punctures on the third elytral interval will distinguish most specimens. On direct comparison the present species, *crugatella*, has slightly smaller eyes than *tripuncta*, a slightly different clypeal outline (more truncate at middle with wings more distinctly but still slightly advanced), usually less punctate head, relatively slightly larger and flatter prothorax, and abdomen less punctate but with more distinct reticulate microsculpture, and at Aitape *crugatella* usually has reduced wings, *tripuncta* always fully developed ones. In *tripuncta* the elytra have 3 or 4 striae free at base; in *crugatella*, always 3. Moreover, *tripuncta* apparently occurs throughout New Guinea, while *crugatella*, though common where it occurs, is known only from three localities all near the middle part of the north coast. I did not clearly distinguish these two species in the field. They probably both occur in wet places, but I do not know whether they actually occur together.

Clivina erugata n. sp.

Description. About average form and convexity; black or piceous, appendages reddish or brownish; reticulate microsculpture faint or absent on front of head and on middle of pronotum and elytra, but present laterally. *Head* (fig. 17) .68 and .67 width prothorax; eyes normally convex, genae short and oblique; antennae normal, median segments about as long as or slightly longer than wide; mandibles short; labrum 7-setose; clypeus broadly emarginate, with wings not separated from middle but slightly advanced, separated from preocular lobes by distinct notches; clypeal suture absent; supraocular convexities continuous with or only slightly separated from swollen preocular lobes; frontal sulci subparallel, sinuous anteriorly; front almost evenly convex or slightly and irregularly impressed, slightly punctulate, sometimes with a few coarser punctures near middle; neck constriction slightly impressed and punctate at sides, usually interrupted at middle. *Prothorax* about as long as wide (L/W 1.05 and .96), narrowed anteriorly (B/A 1.52 and 1.57); subtruncate or broadly emarginate anteriorly; anterior angles narrowly rounded, not advanced; posterior angles obtusely angulate, bluntly dentate; lateral margins entire, each with usual 2 setae; disc normally convex, with usual impressed lines, and faintly punctulate. *Elytra* slightly wider than prothorax (E/P 1.21 and 1.25); base slightly emarginate, with tubercles at bases of 2nd and 3rd intervals; humeri rounded, sides behind humeri nearly straight to or beyond middle; each elytron with usually 3 (sometimes 4) striae free at base; striae entire, well impressed, punctulate; intervals moderately convex, 3rd 4-punctate, 7th and 8th united but scarcely (or briefly) carinate at humerus, intervals not distinctly punctulate. *Inner wings* fully developed. *Lower surface:* proepisterna with reticulate microsculpture and some wrinkles externally, lightly rugose internally; abdomen microreticulate, vaguely punctate laterally; last ventral with 2 setae each side far apart. *Legs:* front tibia 3-dentate; middle tibia (fig. 31) with a moderate spur on outer side near apex. *Measurements:* length 6.5-8.0; width 2.0-2.5 mm.

Types. Holotype ♂ (M.C.Z. No. 30,164) and 28 paratypes from Dobodura, **Papua**, Mar.-July 1944 (Darlington).

Other material. **Papua**: 10, Oro Bay, Dec. 1943 (Darlington). **N-E. N. G.**: 3, Aitape, Aug. 1944 (Darlington). **Neth. N. G.**: 8, Hollandia, July- Sept. 1944 (Darlington), and 1, same locality, Apr. 1945 (B. Malkin, U.S.N.M.); 2, Hollandia area, W.

Sentani, Cyclops Mts., 50-100 m. (*c.* 150-325 ft.), June 22-24, 1959 (J. L. Gressitt, Bishop Mus.) in light trap; 13, Maffin Bay, Aug. 1944 (Darlington), and 3, same locality, June and Aug. 1944 (E. S. Ross, California Acad.); and 1, "Neth. New Guinea," Oct. 20, 1944 (T. Aarons, California Acad.). I have this species also from Cape Gloucester, **New Britain**, Jan.-Feb. 1944 (Darlington), and Muda P. T. Area, New Georgia Is., British **Solomons**, Nov. 20, 1943 (J. G. Franclemont, Cornell U. Coll.).

Measured specimens. The ♂ holotype and 1 ♀ paratype.

Notes. This is the only species I know from New Guinea that comes close to answering the short description of *Clivina schaubergeri* Kult, but *schaubergeri* is evidently slightly larger, with more slender antennae than the present species.

Clivina basalis Chaudoir

Chaudoir 1843, Bull. Soc. Nat. Moscou **16**, No. 4, p. 733.
Sloane 1896, Proc. Linn. Soc. New South Wales **21**, pp. 212 (key), 213.
—— 1905, Proc. Linn. Soc. New South Wales **29**, p. 721 (key).
Csiki 1927, Coleop. Cat., Carabidae, Carabinae, p. 498 (see for synonymy and additional references).
Clivina ephippiata Putzeys (new synonym).
Putzeys 1846, Mem. Soc. R. Sci. Liege **2**, p. 602.
Sloane 1920, Proc. Linn. Soc. New South Wales **45**, p. 320 (see for Australian synonyms).
Csiki 1927, Coleop. Cat., Carabidae, Carabinae, p. 502 (see for additional references).

Description. See key to species of *Clivina*, and following notes.

Types. Of *basalis*, from "Nouvelle Hollande" (= Australia), presumably now in the Oberthür collection, Paris Mus.; of *ephippiata*, from Java, in the Chevrolat collection, Oxford University Mus.

Occurrence in New Guinea. **Papua**: 5, Dobodura, Mar.-July, 1944 (Darlington), taken at light; 1, Oro Bay, July 12, 1944 (A. H. Mallery, Bishop Mus.). Also 1 from Koitaki, N. G., 1,500 ft., Oct.-Nov. 1928. (Pemberton, Hawaiian Sugar Planters' Association); I have been unable to locate this locality.

Notes. This species varies in color both individually and geographically. Specimens from temperate **southeastern Australia** (*e.g.* Sydney and Brisbane) and from **New Guinea** and **Celebes** usually have the elytra bicolored, red anteriorly and black posteriorly, with the black color often reaching the 9th intervals

and margins laterally (*basalis*). Specimens from **tropical Australia** and **Java** usually have black area of the elytra reduced to a large, but variable, post-median macula (*ephippiata*). There is some individual variation too, and entirely pale (immature?) individuals sometimes occur with the bicolored ones. This widely distributed species (if it is all one species) deserves more study than I can give it now. For the present I can see no real difference except color to separate the geographical populations, and the color forms are distributed so irregularly (discontinuously) that I do not care to treat them as subspecies. Sloane (1920) has already indicated the apparent identity of the tropical Australian and Javan forms.

Clivina subfusa n. sp.

Description. A little broader than usual in genus; normally convex; reddish piceous, disc of elytra often darker; reticulate microsculpture faint or absent on front of head and discs of pronotum and elytra, present on posterior declivity of pronotum (isodiametric or slightly transverse) and sides and apices of elytra (slightly longitudinal). *Head* .68 and .69 width prothorax; eyes moderately prominent but enclosed behind by short genae which form obtuse (nearly right) angles with neck; antennae normal, middle segments slightly longer than wide; mandibles short; labrum 7-setose; clypeus broadly emarginate, wings not separated from middle part but separated from preocular lobes by moderate notches; clypeal suture absent; supraocular convexities separated from preocular lobes by impressions; frontal sulci curving outward posteriorly, almost straight between eyes, sinuous anteriorly; front irregularly punctate; neck constriction scarcely impressed but marked at sides by punctate areas which are usually (not always) separated by an impunctate median space. *Prothorax* slightly wider than long, W/L 1.07 and 1.08; base/apex 1.45 and 1.43; sides slightly arcuate; anterior margin broadly emarginate, but anterior angles scarcely advanced; posterior angles obtuse, dentate; median longitudinal and anterior transverse impressed lines normal; disc finely punctate. *Elytra* 1.30 and 1.23 width prothorax; humeri normally rounded; each elytron with usually 3 (rarely 4) striae free at base; striae entire, well impressed, punctulate; intervals moderately convex, inner ones tuberculate or subtuberculate at extreme base, 7th subcarinate at base, 3rd with 4 discal punctures (sometimes very inconspicuous) near outer

edge; surface of intervals vaguely or not punctulate. *Inner wings* fully developed. *Lower surface:* proepisterna strongly rugulose, and also lightly microreticulate externally; ventral segments microreticulate, and with punctate-rugulose areas laterally, these areas being near the anterior margins of the last three segments and entirely across the base of the last segment; last ventral segment with 2 setae on each side widely separated. *Legs:* anterior tibiae 3-dentate; middle tibiae (fig. 32) with spur short, near apex. *Measurements:* length 6.6-7.3; width 2.1-2.3 mm.

Types. Holotype (sex not det.) (M.C.Z. No. 30,165) and 2 paratypes from Chimbu Valley, Bismarck Range, **N-E. N. G.**, 5,000-7,500 ft., Oct. 1944 (Darlington), taken in open country, presumably in wet places. Additional paratypes as follows. **N-E. N. G.**: 1, Baindoang, Salawaket Range, 1800 m. (*c.* 5850 ft.), Sept. 15, 1956 (E. J. Ford Jr., Bishop Mus.). **Neth. N. G.**: 1, Baliem Camp, Snow Mts., 1,600 m. (about 5,200 ft.), Dec. 1938 (Toxopeus); 4, Ibele (Iebele) Camp, Snow Mts., 2,250 m. (about 7,325 ft.), Nov.-Dec. 1938 (Toxopeus); 1, Fac Fac, S. coast of Bomberai, 100-700 m. (*c.* 325-2300 ft.), June 9, 1959 (J. L. Gressitt, Bishop Mus.) in light trap.

Other material. One, Dobodura, **Papua**, Mar.-July 1944 (Darlington). This specimen is not typical; it has the 3rd intervals only 3-punctate; more material is needed to show whether it is really *subfusa* or whether it may be a lowland form related to (mountain-living) *subfusa.*

Measured specimens. The holotype and one paratype from Chimbu Valley.

Notes. This species is distinguished from others in New Guinea by characters given in the key, above. It is similar to *truncata* Putzeys as identified by Andrewes, but, as compared with Andrewes' specimen of *truncata,* the new species has smaller eyes and differs slightly in other ways: e.g. the rugose-punctate line across the neck is almost entire in *truncata,* usually (but not always) widely interrupted at middle in *subfusa.*

Clivina gressitti n. sp.

Description. Slightly more parallel and more convex than average (incipiently subcylindrical, but not strongly so); rufous; rather shining, reticulate microsculpture almost absent above. *Head* .70 and .67 width prothorax; eyes of only moderate size but prominent, genae forming *c.* right angles with sides of

neck; antennae normal, rather short, intermediate segments as wide as or slightly wider than long; mandibles short; labrum 7-setose; clypeus subtruncate with wings slightly advanced, middle part not separated from wings; wings separated from preocular lobes by shallow notches; clypeal suture absent; supraocular convexities separated or very nearly separated from preocular lobes by slight impressions; frontal sulci long, somewhat diverging posteriorly, sinuous anteriorly; front with or without median fovea but always with a few scattered median punctures and sparse, scattered punctules; neck constriction weak, punctate only at sides, interrupted at middle. *Prothorax* slightly longer than wide (L/W 1.05 and 1.02), moderately narrowed in front, slightly so behind (base/apex 1.29 and 1.38); sides nearly straight and converging anteriorly for much of length, faintly sinuate before middle; apex subtruncate or very broadly emarginate; posterior angles obtuse-rounded, finely bluntly denticulate; disc with usual impressed lines, more distinctly punctate than usual, but punctures rather widely spaced and variable in size: no distinct (or at most an indefinite) line of coarser punctures each side basally. *Elytra* only slightly wider than prothorax (E/P 1.09 and 1.04); humeri rounded-prominent; margins slightly crenulate behind humeri; each elytron with 3 striae free at base; striae entire (slightly abbreviated apically as usual), moderately impressed, punctulate; intervals convex, not distinctly punctulate, 3rd very inconspicuously 4-punctate, 8th rather weakly carinate or subcarinate at base. *Inner wings* fully developed. *Lower surface:* proepisterna and sides and apex of abdomen rather coarsely punctate; last ventral with 2 apical setae on each side wide apart. *Legs:* front femur very stout; front tibia 3-dentate with 4th tooth indicated; front trochanter not prominent at apex; middle tibia (fig. 36) with spur short (about ½ long as width of tibia), less than ¼ from apex of tibia. *Measurements:* length 5.3-5.5; width 1.4-1.5 mm.

Types. Holotype (sex not determined) (Bishop Mus.) and 3 paratypes (1 in M.C.Z., No. 30,307) all from Kiunga, Fly R., **Papua**, various dates in July, Aug., and Oct., 1957 (W. W. Brandt).

Measured specimens. The type and 1 paratype.

Notes. This species has many of the same technical characters as *subfusa*, including the short tibial spur, but differs notably in form, being more slender and parallel-sided. The difference is

well shown by the difference in proportions of prothorax and in ratio of elytra/prothorax.

Clivina sellata Putzeys

Putzeys 1866, Ent. Zeitung (Stettin) **27**, p. 40.
Sloane 1905, Proc. Linn. Soc. New South Wales **29**, p. 719 (in key).
Clivina inconspicua Sloane (new synonym).
Sloane 1896, Proc. Linn. Soc. New South Wales **21**, p. 277.
—— 1905, Proc. Linn. Soc. New South Wales **29**, p. 719 (in key).
(Unimportant references omitted.)

Description. See key. *C. sellata* is a small, rather convex (subcylindrical) species, typically (in Australia) dark brown, with elytra paler with a post-median discal dark spot; the (color form?) *inconspicua* is entirely testaceous.

Types. Of *sellata*, from **Australia**, in the Chaudoir collection now presumably with the Oberthür collection, Paris Mus.; of *inconspicua*, from King's Sound, **Australia**, in Macleay Mus., Sydney.

Occurrence in New Guinea. **Papua**: 1, Dobodura, Mar.-July, 1944 (Darlington).

Notes. C. sellata is widely distributed in eastern and northern Australia. Testaceous individuals are to some extent geographically segregated, but they do not seem to form a clearly defined geographical subspecies. The single example from New Guinea is testaceous and is less convex than usual in *sellata*, but I find no positive characters to separate it. *C. sellata* and related species in Australia are difficult to distinguish and in need of study.

In Australia, *sellata* occurs in sandy banks of streams.

Clivina ferruginea Putzeys

Putzeys 1868, Ann. Soc. Ent. Belgique **11**, p. 14.
Sloane 1896, Proc. Linn. Soc. New South Wales **21**, pp. 198, 199, 275.
—— 1905, Proc. Linn. Soc. New South Wales **29**, p. 720 (key).
(Unimportant references omitted.)

Description. See key; *ferruginea* is a plain brown species of the difficult *australasiae* group, with 4-dentate anterior tibiae.

Type. From Rockhampton, **Australia**, in the Castelnau collection. The collections and parts of collections made by Castelnau are widely scattered. I do not know where the type of *ferruginea* now is. I did not find it at Melbourne in 1957.

Occurrence in New Guinea. **Papua**: 2, Port Moresby, Feb.-May 1943 (W. B. Jones, A. M. N. H.); 1, same locality, May 1947 (L. Jones, British Mus.).

Notes. This species is common and widely distributed in northern Australia, in wet ground near water. That it extends to southern New Guinea is not surprising. The country around Port Moresby is much like parts of northern Australia.

Clivina fessa n. sp.

Description. Slightly broader and more depressed than usual; reddish-piceous, appendages paler; moderately shining, but elytra with at least traces of reticulate microsculpture extending onto disc. *Head* (fig. 16) .76 and .73 width prothorax; eyes large (in genus); genae short, not entirely enclosing eyes behind, forming right angles with sides of neck; antennae normal, intermediate segments about as long as wide; mandibles short; labrum 7-setose; clypeus subtruncate, very broadly emarginate, with middle part not separated from wings but latter separated from preocular lobes by moderate notches; clypeal suture absent; supraocular convexities separated from preocular lobes by variable (sometimes slight) impressions; frontal sulci straight and diverging posteriorly, irregular and curving outward anteriorly; front irregularly convex, finely and sparsely punctate or with coarser punctures anteriorly; neck scarcely impressed, punctate at sides, zone of punctures irregularly interrupted at middle. *Prothorax* slightly wider than long (W/L 1.10 and 1.08); base/apex 1.33 and 1.29; sides slightly arcuate; front margin truncate-emarginate, with anterior angles scarcely advanced; posterior angles rounded-obtuse but marked by blunt teeth; median longitudinal line and anterior transverse line well impressed; disc punctulate and transversely strigose but without reticulate microsculpture except at sides and base (but reticulations sometimes extend to parts of disc). *Elytra* somewhat wider than prothorax (E/P 1.34 and 1.30); humeri rounded but moderately prominent; sides subparallel, suberenulate behind humeri; each elytron with 3 striae free at base; striae entire, moderately impressed, faintly punctulate; intervals slightly convex, 3rd 4-punctate on outer edge, neither 7th nor 8th distinctly carinate at base; intervals with reticulate microsculpture very lightly impressed on disc and sometimes absent in an anterior-median area. *Inner wings* fully developed. *Lower surface:* proepisterna rather strongly rugose or punctate-rugose; ventral

segments of abdomen rugose or punctate laterally, the rugose-punctate areas almost meeting across the base of the apical segment, which is otherwise lightly microreticulate; two apical setae on each side wide apart. *Legs:* anterior femora (fig. 38) more slender than usual; anterior tibia strongly 3-dentate with 4th (upper) tooth barely indicated; middle tibia (fig. 33) with spur about as long as width of tibia, and less than ¼ tibial length from apex. *Measurements* (types only): length 6.6-6.9; width 2.0-2.1 mm.

Types. Holotype (M.C.Z. No. 30,166) (sex not det.) from Hollandia, **Neth. N. G.**, July-Sept. 1944 (Darlington); 1 paratype, same locality, May 1945 (Hoogstraal, M.C.Z.); 1 paratype, Fac Fac, **Neth. N. G.**, June 1939 (R. G. Wind, M.C.Z.).

Other material. One, Camp Nok, **Waigeu Is.**, 2,500 ft., April 1938 (Cheesman); this specimen is smaller (*c.* 5.6 mm.) than the types, with elytral margins more strongly crenulate. Also 1, Guadalcanal, **Solomons**, July 15, 1943 (P. W. Oman, U.S.N.M.), which has the characters of *fessa* except that the 7th elytral interval is almost carinate at base.

Measured specimens. The type and paratype from Hollandia.

Notes. Although this species is superficially rather similar to several others that occur in New Guinea, it is well characterized by the relatively slender anterior femora, the position of the spur of the middle tibia, and (usually) the lack of a distinct carina at the base of the 7th or 8th elytral intervals. I do not know the relationships of the species.

Clivina sansapor n. sp.

Description. Subparallel, about average convexity; reddish piceous, appendages paler; moderately shining, most of upper surface without reticulate microsculpture but latter visible at extreme margins and basal declivity of pronotum and sides and apex of elytra. *Head* .73 and .71 width prothorax; eyes moderately prominent but almost enclosed behind by short genae, which form almost right angles with neck; antennae normal, middle segments about as long as wide; mandibles short; labrum 7-setose; clypeus subtruncate, or very broadly emarginate, with wings not separated from middle part but separated from preocular lobes by moderate notches; clypeal suture absent; supraocular convexity sharply separated from swollen preocular lobes; frontal sulci subparallel between eyes, sinuous anteriorly; front slightly convex with a few punctures near middle; neck

constriction only a little impressed but marked by lateral punctate areas which meet or almost meet at middle. *Prothorax* as long as or slightly longer than wide (L/W 1.04 and 1.00); base/apex 1.33 and 1.36; sides almost straight (actually faintly subsinuate) in outline, slightly converging anteriorly; apex subtruncate, very broadly emarginate; anterior angles not advanced; posterior angles obtuse, marked by distinct blunt denticles; median longitudinal line and anterior transverse line normally impressed; a well marked longitudinal group of punctures on disc on each side behind middle slightly nearer margin than median line; disc otherwise at most faintly punctulate, with a few irregular transverse strigae. *Elytra* slightly wider than prothorax (E/P 1.14 and 1.13); humeri rounded but prominent; each elytron with three striae free at base; striae well impressed basally, very light toward apex, punctulate; intervals slightly convex, 3rd 4-punctate on outer edge, 8th carinate at base; surface of intervals not distinctly punctulate. *Inner wings* fully developed. *Lower surface:* proepisterna rugulose-punctate internally, microreticulate externally; abdomen microreticulate, more or less punctate laterally; last ventral segment punctate especially laterally but with some punctures scattered over most of surface, with 2 apical setae on each side wide apart. *Legs* rather stout; anterior tibiae strongly 3-dentate, with 4th (upper) tooth indicated by a slight obtuse angle; middle tibiae (fig. 34) with spur long, about ⅓ from apex. *Measurements:* length 6.1-6.6; width 1.6-1.7 mm.

Types. Holotype ♂ (M.C.Z. No. 30,167) and 3 paratypes all from Sansapor, **Neth. N. G.**, Aug. 1944 (Darlington).

Other material. Three, Kiunga, Fly R., July 23-25, Aug. 5-7, 14-17, 1957 (W. W. Brandt, Bishop Mus.). These specimens are doubtfully assigned here. They may be variants of *brandti*.

Measured specimens. The holotype and 1 paratype.

Notes. This species is distinguished from similar ones in New Guinea primarily by the ventral punctation. I do not know its relationships.

Clivina csikii Kult

Kult 1951, Acta Soc. Ent. Czechoslovakia **48**, pp. 29, 30.

Description (checked against the type). More slender and convex than average; nearly black, appendages yellowish; rather shining, reticulate microsculpture indistinct or absent on front

and on discs of pronotum and elytra, present at sides and base pronotum and sides and apex of elytra. *Head* .80 width prothorax; eyes moderately large and prominent, genae forming *c.* right angles with sides of neck; antennae normal, intermediate segments as wide as or slightly wider than long; mandibles short; labrum 7-setose; clypeus subtruncate, very slightly emarginate, middle part not separated from wings and wings not advanced; wings separated from preocular lobes by moderate notches; clypeal suture absent; supraocular convexities separated from preocular lobes by well defined impressions; frontal sulci straight and parallel between eyes, sinuous anteriorly; front with slight median impression, rather vaguely punctate; neck impression rather weak, punctate at sides, interrupted at middle. *Prothorax* longer than wide (L/W 1.09), slightly narrowed anteriorly (base/apex 1.27); sides nearly straight; apex subtruncate (broadly emarginate at middle); posterior angles rounded except marked by very faint sinuations; disc with usual impressed lines, finely and sparsely punctulate, with line of coarser punctures each side behind middle. *Elytra* slightly wider than prothorax (E/P 1.14); humeri prominent but rounded; each elytron with 3 striae free at base; striae entire (except normally abbreviated at extreme apex), well impressed, punctulate; intervals convex, 3rd 4-punctate on outer edge, 8th forming a long, fine carina at base. *Inner wings* fully developed. *Lower surface:* proepisterna microreticulate or rugulose but not punctate; most of abdomen including most of last ventral segment closely microreticulate but not punctate; last ventral segment with 2 setae on each side wide apart. *Legs:* front tibiae strongly 3-dentate with 4th (upper) tooth indicated; middle tibia with spur about ¼ from apex and about as long as tibial width. *Measurements:* length *c.* 5.0 (given by Kult as 4.8, but the specimen is not quite straight); width *c.* 1.3 mm.

Type. From Madang (Friedrich-Wilh.-hafen), **N-E. N. G.**, 1901 (Biró, Hungarian National Mus.). I am indebted to Dr. Z. Kaszab for an opportunity of examining it.

Measured specimen. The type.

Notes. I have seen no other specimen of this species. It occurs within the geographical range of the following species, which is probably related but distinct. See notes under the following species.

Clivina inopaca n. sp.

Description. Form average, normally convex; black or brownish; antennae, mouth parts, and legs (irregularly) brown; shining, microsculpture indistinct or absent on discs of pronotum and elytra, present at sides and base of pronotum and sides and apex of elytra. *Head.* .74 and .75 width prothorax; eyes moderately large and prominent; genae short, forming *c.* right angles with neck; antennae normal, intermediate segments about as long as wide; mandibles short; labrum 7-setose; clypeus very broadly emarginate, middle part not separated from wings, latter separated from preocular lobes by variable notches; clypeal suture absent; supraocular convexities separated from preocular lobes by impressions; frontal sulci straight and parallel between eyes, sinuous anteriorly; front with median impression and a few scattered punctures; neck only slightly impressed but with transverse punctate areas on each side, sometimes almost meeting at middle. *Prothorax* as wide as long (W/L 1.00 and 1.03), moderately narrowed anteriorly (B/A 1.37 and 1.34); sides slightly arcuate, almost straight at middle, sometimes subsinuate, sometimes slightly crenulate; apex subtruncate, slightly emarginate, with angles scarcely advanced; posterior angles broadly rounded, each marked by a slight, blunt tooth; disc with usual impressed lines, with longitudinal group of punctures on each side behind middle slightly nearer side than middle, and with a little very fine, sparse, inconspicuous punctulation elsewhere. *Elytra* slightly wider than prothorax (E/P 1.20 and 1.17), normally formed; humeri prominent but rounded; each elytron with three striae free at base; striae entire at apex (except on final declivity), well impressed, punctate or punctulate; intervals convex, 3rd 4-punctate on outer edge; 8th carinate at base; surface of intervals not distinctly punctulate. *Inner wings* fully developed. *Lower surface:* proepisterna rugulose but not punctate; sides of abdomen shagreened but not distinctly punctate; last ventral segment lightly shagreened (with close isodiametric microsculpture) but not punctate, with two apical setae on each side wide apart. *Legs:* front femur stout (fig. 39); front tibiae strongly 3-dentate, with 4th (upper) tooth weakly developed; middle tibiae (fig. 35) with spur about as long as tibial width on outer side at or above ¼ from apex. *Measurements* (of types): length 6.3-6.9; width 1.7-1.9 mm.

Types. Holotype ♀ (M.C.Z. No. 30,168) and 4 paratypes from Dobodura, **Papua**, Mar.-July 1944 (Darlington), taken in wet places.

Other material. **Papua**: 1, Upper Fly R., Oroville, Aug. 10-12, 1936 (Archbold Exped., A. M. N. H.); 2, Kiunga, Fly R., Sept. 24-25, 1957 (W. W. Brandt, Bishop Mus.). **N-E. N. G.**: 1, Nadzab, July 1944 (Darlington); 12, Aitape, Aug. 1944 (Darlington). **Neth. N. G.**: 1, Hollandia, May 1945 (Hoogstraal, M.C.Z.); 1, Hollandia area, W. Sentani, Cyclops Mts., 150-250 m. (*c.* 500-800 ft.), June 25, 1959 (T. C. Maa, Bishop Mus.) in M. V. light trap. Also 3, Cape Gloucester, **New Britain**, Jan.-Feb. 1944 (Darlington).

Measured specimens. The ♀ holotype and 1 ♀ paratype.

Notes. Distinguishing characters of *inopaca* are given in the key to *Clivina* of New Guinea. The species is similar to some Australian species of the *australasiae* group and does itself occur in **Australia** (Cape York Peninsula) but does not seem to have been described there. It is also similar to *csikii* (above) but is larger, relatively broader, and less convex.

The Aitape specimens vary so much that I tried to separate some of them as different species characterized by more convex form, shallower notches between clypeal wings and preocular lobes, and more coarsely punctate elytral striae, but these characters failed to hold even in the series from Aitape. Proportions and measurements of specimens from Aitape (H/P .72 and .71; prothoracic W/L 1.02 and 1.00 and B/A 1.38 and 1.37; and E/P 1.14 and 1.17; length 5.5-7.3, width 1.5-2.0 mm.) are not significantly different from those of the types.

This species lives in damp ground in swamps and by standing water.

Clivina brandti n. sp.

Description. Form and convexity about average; black or reddish piceous, suture not or not much paler, appendages browner; moderately shining, reticulate microsculpture faint or absent above except at sides and base of pronotum and sides and apex of elytra. *Head* .70 and .72 width prothorax; eyes moderately large and prominent, genae forming *c.* right angles with sides of neck; antennae normal, intermediate segments about as wide as long; mandibles short; labrum 7-setose; clypeus subtruncate, usually broadly (sometimes slightly irregularly) emarginate, middle part not separated from wings; wings not or not much advanced, separated from preocular lobes by notches; clypeal suture indistinct (at most indicated by rather poorly defined transverse impression); supraocular convexities

separated from preocular lobes by well defined impressions; frontal sulci long, straight and parallel between eyes, sinuous anteriorly; front irregularly but usually distinctly and somewhat longitudinally impressed, with some coarse punctures at middle and finer scattered punctures (but somewhat variable in punctation); neck constriction moderate, rather coarsely punctate, usually not interrupted at middle. *Prothorax* slightly longer than wide (L/W 1.03 and 1.04), moderately narrowed anteriorly, slightly so posteriorly (base/apex 1.38 and 1.32); sides nearly straight for much of length except subsinuate before middle; apex subtruncate or slightly emarginate; posterior angles very obtuse, bluntly denticulate; dise with usual impressed lines, punctulate, with line of coarser confluent punctures each side near base. *Elytra* slightly wider than prothorax (E/P 1.08 and 1.12); humeri prominent but rounded; each elytron with 3 striae free at base; striae entire (except normally abbreviated at apex), well impressed, punctulate; intervals convex, finely and inconspicuously punctulate, 3rd 4-punctate on outer edge, 8th long-carinate at base. *Inner wings* fully developed. *Lower surface:* proepisterna microreticulate, longitudinally rugose internally, but hardly punctate; abdomen microreticulate but not punctate or at most with last segment faintly subpunctate; last ventral with 2 apical setae on each side wide apart. *Legs:* front femora moderately stout; front tibiae strongly 4-dentate but upper tooth of course small; front trochanters more or less acute and prominent at apex; middle tibiae (fig. 37) with spurs about ¼ from apex longer than tibial width. *Measurements:* length 6.5-7.0; width 1.7-1.9 mm.

Types. Holotype (sex not determined) (Bishop Mus.) and 29 paratypes from Kiunga, Fly R., **Papua**, various dates in July, Aug., Sept., and Oct., 1957 (W. W. Brandt). Some paratypes now in M.C.Z. (No. 30,308).

Other material. With the types of *brandti* at Kiunga, Brandt collected also 3 specimens with sides and apex of abdomen punctate (*sansapor*), 3 with (partly decomposed) reticulate microsculpture on disc of elytra (*szekéssyi*), and 2 larger, smoother individuals without discal microsculpture (*inopaca*). Whether these actually represent different species or whether they are extreme variations of one species I cannot be sure—this is one of those difficult cases in which a taxonomist can only make a tentative classification and hope that more material will solve the problem. In the meantime I have listed the specimens in

question under the species indicated.

Measured specimens. The holotype and 1 paratype.

Notes. Although this species clearly falls in the *australasiae* group of *Clivina* (see couplet 14 of key to species of genus), the rather strong punctation of head and unusually long spur of middle tibia suggest a possible relationship with *puncticeps* too.

Clivina székessyi Kult

Kult 1951, Acta Soc. Ent. Czechoslovakia **48**, p. 30.

Description (of type). About average for genus in form and convexity; nearly black, suture (anteriorly) and edges of elytra slightly reddish, and head and pronotum not quite black (slightly reddish) in strong light, appendages reddish brown; front shining, not distinctly microreticulate, discs of pronotum and elytra entirely microreticulate or at least covered with rather close-set minute impressed lines probably representing slightly decomposed microreticulation. *Head* .70 width prothorax; eyes moderately large and prominent, genae short, forming *c.* right angles with sides of neck; antennae normal, median segments about as wide as long (or just longer than wide); mandibles short; labrum 7-setose; clypeus very broadly emarginate, wings not separated from median part and not advanced but separated from preocular lobes by nearly rectangular notches; preocular lobes with outer edges oblique for much of length; clypeal suture indistinct; preocular lobes separated from supraocular convexities by well defined impressions; frontal sulci parallel posteriorly, sinuous anteriorly; front slightly irregular, subfoveate at middle, irregularly punctulate; neck impression moderate, punctate at sides, rather narrowly interrupted at middle. *Prothorax:* width/length .99; base/apex 1.42; sides faintly sinuate before middle, slightly and sparsely crenulate; apex subtruncate (broadly emarginate); posterior angles broadly rounded, subdentate; disc with usual impressed lines, with some transverse strigulation, not distinctly punctate but with impressed line each side before base. *Elytra* slightly wider than prothorax (E/P 1.14), normally formed; humeri broadly rounded but prominent; each elytron with 3 striae free at base; striae well impressed, virtually entire, finely punctate; intervals somewhat convex, 3rd with 4 moderately distinct dorsal punctures on outer edge, 8th carinate at base, surface of intervals with microsculpture as described but not otherwise punctate.

Inner wings fully developed. *Lower surface:* proepisterna microreticulate externally, rather lightly punctate or rugulose internally; ventral segments microreticulate but not punctate; last ventral with 2 setae each side wide apart. *Legs:* front femora moderately stout, with lower edges slightly arcuate but not strongly lobed; front tibiae strongly 3-dentate externally with 4th (upper) tooth indicated as a rectangular projection; middle tibia with spur longer than tibial width and about ¼ from apex. *Measurements:* length 7.0; width 2.0 mm. (almost exact).

Types. Holotype ♀ (Hungarian National Mus.) from Simbang, Huon Gulf, **N-E. N. G.**, 1899 (Biró); and 1 ♀ paratype (Kult collection) from Fenichel (also apparently collected by Biró in New Guinea, but I have not found the locality).

Measured specimen. The holotype.

Occurrence in New Guinea. I tentatively assign here the following specimens. **Neth. N. G.**: 1, Hollandia, July-Sept. 1944 (Darlington); 7, same locality, Apr., May, and June 1945 (Malkin, U.S.N.M.); 1, same locality, May 1945 (Hoogstraal, M.C.Z.); 2, Waris, S. of Hollandia, 450-500 m. (*c.* 1450-1625 ft.), Aug. 1-2, 1959 (T. C. Maa, Bishop Mus.); 3, Sabron, Cyclops Mts., 930 and 1,200 ft., May and June 1936 (Cheesman). **N-E. N. G.**: 1, Nadzab, July 1944 (Darlington); 1, Torricelli Mts., Siaute, sea level, Sept. 9-17, 1958 (W. W. Brandt, Bishop Mus.). **Papua**: 35, Dobodura, Mar.-July 1944 (Darlington); 3, Kiunga, Fly R., July 11-14, 26-30, Aug. 1-3, 1957 (W. W. Brandt, Bishop Mus.).

Notes. The specimens listed above vary somewhat in color (black or brown) and other minor characters, but I cannot distinguish more than one species. Most of the Dobodura specimens were taken in shady, grassy ground by standing water. I am indebted to Dr. Z. Kaszab for an opportunity of examining the type of this species.

Clivina netolitzkyi Kult

Kult 1951, Acta Soc. Ent. Czechoslovakia **48**, p. 30.

Description. Kult indicates that this species has the same characters as the preceding one except color brownish with 1 external interval of each elytron piceous and antennae and legs reddish; elytra with striae less distinctly punctate, intervals less convex, 3rd with 4 dorsal punctures more distinct; and front tibia with upper tooth indistinct. Length 6.9 mm.

Type. Holotype ♂ (Kult collection) from Erima, Astrolabe Bay, **N-E. N. G.**

Notes. I cannot judge, from the description, whether or not this species is really distinct from the preceding one.

(Subfam. MORMOLYCINAE)
(Tribe MORMOLYCINI)
(Genus MORMOLYCE Hagenbach)

Hagenbach 1825, Mormolyce Novum Coleopterorum Genus, p. 3.
Rousseau 1906, *in* Wytsman, Genera Insectorum, Fasc. 40, p. 3.
Csiki 1928, Coleop. Cat., Carabidae, Mormolycinae, p. 1.
Andrewes 1930, Cat. Indian Carabidae, p. 222 (see for additional references).
—— 1941, Ann. Mag. Nat. Hist. (11) **7**, p. 315.

Notes. This genus of 5 or 6 species of very large, extraordinarily flattened and expanded Carabidae occurs in the Malay Peninsula and (southern?) Thailand, and Sumatra, Java, and Borneo. It has been doubtfully recorded from New Guinea by Rousseau on the authority of Ritsema, but the record is presumably an error.

Subfam. HARPALINAE
(Tribe APOTOMINI)
(Genus APOTOMUS Illiger)

Illiger 1807, Magazin für Insektenkunde **6**, p. 348.
Csiki 1928, Coleop. Cat., Carabidae, Harpalinae **1**, p. 5 (see for additional references).
Andrewes 1930, Cat. Indian Carabidae, p. 32.
—— 1935, Fauna British India etc., Coleop., Carabidae **2**, p. 29.
Jeannel 1946, Coléop. Carabique de la Région Malgache, Part 1, p. 316.

Diagnosis. See Andrewes' key to tribes (1935, pp. 1 ff.); *Apotomus* is the only genus of its tribe. The species are small (usually 3 to 4 mm.), black or brown, pubescent, with peduncular prothorax and fully developed inner wings.

Description. See Andrewes (1935).

Genotype. Scarites rufus Rossi (Mediterranean region).

Generic distribution. The Mediterranean region, parts of Africa, Madagascar, tropical Asia and islands to Celebes and Philippines, and Australia, but perhaps not New Guinea.

(Apotomus atripennis Motschulsky)

Motschulsky 1858, Étude Ent. **7**, p. 22.

Andrewes 1935, Fauna British India etc., Coleop. Carabidae **2**, p. 30 (see for synonymy and additional references).

Description. None needed here; see Andrewes (*loc. cit.*).

Type. From near Colombo, Ceylon; in Moscow University Mus. (*t.* Andrewes).

Occurrence in New Guinea. Doubtful.

Notes. A. atripennis is widely distributed in tropical Asia and extends east to Celebes and the Philippines. It has been recorded from New Guinea, but I doubt its occurrence there: the only supposedly New Guinean specimens that I have seen are from Wallace's dubious "Dorey" collections (see p. 331). In Luzon, this species occurs in open, grassy country, on or in the surface of the ground. It is sometimes common in flood debris and at light.

Tribe BEMBIDIINI

Csiki 1928, Coleop. Cat., Carabidae, Harpalinae **1**, p. 27 (see for synonyms and additional references).

Sloane 1921, Proc. Linn. Soc. New South Wales **46**, p. 192 (Australian genera).

Andrewes 1935, Fauna British India etc., Coleop., Carabidae **2**, p. 80.

Bembidiitae Auct. incl. Jeannel 1946, Coléop. Carabiques de la Région Malgache, Part 1, p. 331.

This is a large tribe of small Carabidae most (but not all) of which live on the surface of the ground, often (but not always) by water or in wet places. Most are nocturnal and hide by day under vegetation or in ground litter or in loose soil or sand, but a few species live on tree trunks or are arboreal, and a few live deep in the soil, and a few are diurnal rather than nocturnal. For some reason, very few species of this tribe occur in eaves, although many Trechini do so.

The two principal genera of the tribe are both almost worldwide in distribution, but they are complementary in their main areas of abundance. *Bembidion* is dominant in cool northern regions, with comparatively few species scattered in the tropics and the southern hemisphere. *Tachys* is dominant in the tropics and some south-temperate regions, with comparatively few species in the cool north. (It should be added that some specialists, including Jeannel, split both these old genera into many smaller ones.)

Key to Genera of Bembidiini of New Guinea

1. Scutellar striae present; front tibiae with apices normal (irregularly rounded); length (in New Guinea) *c.* 4 mm. (p. 399) .. *Bembidion*
— Scutellar striae absent; front tibiae with outer apical angles obliquely truncate-emarginate; length (in New Guinea) less than 4 mm. 2
2. Upper surface glabrous except for fixed setae (in New Guinean species); apical recurved striole of elytron usually (not always) well developed (p. 340) ..... *Tachys*
— Upper surface with short pubescence; apical strioles absent or rudimentary (p. 484) ..... *Limnastis*

Genus BEMBIDION Latreille

Latreille 1802, Hist. Nat. Crustacés et Insectes **3**, p. 82.
Sloane 1921, Proc. Linn. Soc. New South Wales **46**, p. 193 (the Australian species).
Csiki 1928, Coleop. Cat., Carabidae, Harpalinae **1**, p. 32 (see for synonyms and additional references).
Andrewes 1930, Cat. Indian Carabidae, p. 38.
—— 1935, Fauna British India etc., Coleop., Carabidae **2**, p. 92.
Darlington 1960, Pacific Insects **1**, pp. 332 ff.

Diagnosis. See key (above), and Andrewes 1935.

Description. See Andrewes 1935.

Genotype. Cicindela quadrimaculata Linnaeus (Holarctic).

Generic distribution. See under tribe Bembidiini, above. A few Asiatic stocks of *Bembidion* reach Sumatra, Java, Borneo, Celebes, and the Philippines (Darlington 1960), some at low altitudes and others on mountains, and several species of the genus occur in (chiefly southern) Australia; in fact one Asiatic species, *B. sobrinum,* is represented in Australia. But only one species of the genus has been found in New Guinea, and it belongs to the specialized, coastal subgenus *Cillenus* (see notes under the following species). The apparent absence of *Bembidion* on the mountains of New Guinea (together with other evidence) suggests that these mountains have *not* been part of a route by which temperate Carabidae have dispersed between Asia and Australia.

BEMBIDION (CILLENUS) ALBERTISI Putzeys

Putzeys 1875, Ann. Mus. Civ. Genova (Genoa) **7**, p. 748.
Andrewes 1938, Proc. R. Ent. Soc. London (B) **7**, p. 192.
Darlington 1953, Coleopterists' Bull. **7**, p. 16.

Description. Rather narrow, subdepressed, dull (greenish?) black, each elytron with a small post-humeral ferrugineous spot; length 4 mm.; see Andrewes for further details.

Type. From Sorong, **Neth. N. G.**, in Genoa Civic Mus. (*t.* Andrewes); I have not seen it.

Occurrence in New Guinea. Known only from the type.

Notes. The subgenus (or genus) *Cillenus* includes a moderate number of species scattered from Europe and Japan to Australia and New Zealand. Most occur on the sea coast, in the inter-tidal zone. The habits of *albertisi* are unknown, but a related species (*alatum* Darl.), on Morotai Is. in the Moluccas, was found in gravel bars beside running fresh water near the sea.

Genus TACHYS Stephens

Stephens 1828, Illustrations of British Ent., Mandibulata **2**, pp. 2, 4.
Sloane, 1921, Proc. Linn. Soc. New South Wales **46**, pp. 194 ff.
Csiki 1928, Coleop. Cat., Carabidae, Harpalinae **1**, p. 165 (see for synonymy and additional references).
Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, pp. 327 ff.
—— 1930, Cat. Indian Carabidae, p. 323.
—— 1935, Fauna British India etc., Coleop. Carabidae **2**, p. 206.
Jeannel 1946, Coléop. Carabique de la Région Malgache, Part 1, p. 334.

Diagnosis. See key (above), and Andrewes 1935.

Description. See Andrewes 1935. Technical characters of *Tachys* are: size small, palpi subulate (that is with last segment reduced to vestige; this character separates *Tachys* etc. from all other more or less similar small Carabidae in New Guinea); outer angle front tibia obliquely truncate-emarginate; scutellar strioles absent; apical recurved strioles of elytra usually (not always) present; and (in New Guinean species) dorsal pubescence (excepting fixed tactile setae) absent. Other characters, perhaps less important for practical purposes, include mandibles short, curved, without setae in scrobes; 2 supraocular and 2 lateral prothoracic setae present on each side (in all New Guinean species); wings usually fully developed, but reduced or dimorphic in a few species (see *scrrula* subspecies *inales,* and the species *ambulatus, avius,* and *brachys* in the following pages); dorsal reticulate microsculpture present or absent, when present usually isodiametric on head, transverse on pronotum and elytra; lower surface usually with prosternum more or less impressed longitudinally and metasternum usually (not always)

variably margined anteriorly between middle coxae (see Andrewes 1925, p. 335); ♂ anterior tarsi dilated or not dilated, if dilated with 2 segments of each tarsus widened (only 1 segment widened in some Oriental species), the widened segments biseriately squamulose below; and ♂ with 1, ♀ 2 setae each side last ventral segment, the position of the inner setae in ♀ differing in different groups.

Genotype. Tachys scutellaris Stephens (Europe).

Generic distribution. Almost world-wide (see under tribe Bembidiini, above).

Notes. There are good structural characters by which *Tachys* can be divided into subgenera or genera (whichever are more useful) and some authors, including Jeannel, have divided it. This is probably the right course in the end, but I am not ready to follow it with the New Guinean species. The *Tachys* of New Guinea ought to be classified on the same system as those of adjacent areas. Classifications have been made of the *Tachys* of Australia (Sloane 1921) and the Orient (Andrewes 1925). However, these two classifications are very different and not easily reconciled with each other. I have chosen to follow Andrewes' system because it is more comprehensive than Sloane's and because most New Guinean species fit into it well. Some species of *Tachys* are very wide-ranging (see following paragraph). This suggests that *Tachys*, or at least some *Tachys*, have dispersed comparatively recently. Most species of the genus are fully winged, and their small size probably makes them especially liable to wind dispersal. They are sometimes carried by man: I have before me 3 widely distributed Oriental-New Guinean species intercepted in plant material shipped to the United States (see under *T. truncatus, ceylanicus,* and *fumicatus,* below).

I recognize 63 full species of *Tachys* in New Guinea (a few others are of doubtful occurrence) belonging to 10 species-groups, of which the distribution is outlined as follows. The *fasciatus* and *politus* groups are more or less world-wide, and each includes very wide-ranging species as well as many more-localized ones: *T. fasciatus* apparently occurs throughout the whole warmer part of the Old World, and *T. ceylanicus* (*politus* group) extends from tropical Asia at least to New Guinea. Both these groups include subgroups that seem to be in process of speciation on New Guinea. The species of these groups occur as a rule on the ground in a variety of wet places, although an

occasional species has entered some special habitat: *e.g. T. aeneus* (*politus* group) occurs in rather dry places away from water. The *quadrillum* group is probably nearly world-wide in distribution but lives especially in coastal or saline habitats although some species occur elsewhere. The species of this group are few but often wide-ranging. Two of them apparently extend from southern Asia to New Guinea or Australia. The *nanus* group is probably nearly world-wide too, in a different special habitat, on or under the bark of trees, although one very distinct New Guinean species (*wallacei*) has invaded the lower foliage of rain forest. Some species of this group too are wide-ranging: *e.g. umbrosus* extends from southern Asia to New Guinea and has apparent close relatives in temperate Eurasia and North America and in eastern Australia. The *fumicatus* group may consist of only three species (unless additional ones occur in Africa), but *fumicatus* itself extends from Africa to Japan to New Guinea, and the other two (probably closely related) species are in Europe and Australia. The *haliploides* group occurs at least from Europe to Australia; the single species that surely occurs in New Guinea (*latissimus*) apparently ranges from southern Asia to Australia. The *truncatus* group is another widely distributed one. It consists of a few, small species, some widely distributed (*truncatus* extends from southern Asia to New Guinea and has apparent close relatives in Europe and Australia), some apparently localized. In contrast to the preceding ones, the *serra* group, of three distinct species plus additional subspecies, is almost confined to New Guinea, extending only (so far as known) to the Moluccas and New Britain (not Australia); it has probably evolved on New Guinea from an Oriental ancestor. The *acaroides* group consists of a few obscure species, too little known to be significant. Finally, the *singularis* group, also very poorly known, presents an extraordinary geographical problem. *T. singularis* is described from Celebes. The only other known species of the group, *yunax,* occurs in New Guinea and the *West* Indies (see p. 482). In summary, I should say that the geographical relationships of New Guinean *Tachys* are complex, but are more Oriental than Australian. New Guinea and Australia do share some species, and a few of these may be Australian in origin, but most of them seem to be Oriental species or members of Oriental groups that have reached New Guinea from Asia rather recently and have continued to Australia. There are a number of very peculiar species or species-groups

of *Tachys* in Australia that are not represented in New Guinea.

Collecting *Tachys* is a task for specialists. Even good general collectors, like Toxopeus and Miss Cheesman, get few of them. Biró, however, did get a long series of one obscure species as well as a few specimens of other species, probably by sifting. Different species of *Tachys* have to be looked for laboriously in a great variety of habitats: by "treading" in many different sorts of fresh and saline wet places (and a few occur in dry places, too), by washing the banks of large and small streams and of pools and ponds, in and out of shade, and by "drowning" or sifting various sorts of debris, loose soil, and leaf litter especially from damp places including rain forest; and additional species occur on fallen logs and under bark in rain forest, perhaps on fungi, or (*Tachys wallacei*) on low foliage or moss-like epiphytes in rain forest. A few hours collecting *Tachys* along the edge of a good flood, *as it rises or soon afterward*, is likely to be worth days of ordinary collecting, although the exact habitats of flood-collected specimens are often doubtful; and some *Tachys* fly to light.

Key to Groups of Tachys of New Guinea

1. Mentum with 2 conspicuous foveae at base (except in minute *truncatus*, p. 431) 2
— Mentum without conspicuous foveae 5
2. Apical elytral striole lacking or, if present, not extending forward as far as posterior dorsal elytral puncture (p. 430) ..... *truncatus* group
— Apical striole present, the posterior elytral puncture on or behind its hooked anterior end 3
3. Elytral margins strongly serrate behind humeri; striation of elytra entire or nearly so (p. 404) ..... *serra* group
— Elytral margins not serrate (in New Guinean species); striation usually reduced 4
4. Posterior dorsal puncture of elytron inside apical striole behind (not attached to) its hooked tip (fig. 40); anterior dorsal puncture usually outside 3rd stria (p. 410) ..... *fasciatus* group
— Posterior dorsal puncture of elytron attached to hooked tip of apical striole (fig. 41); anterior puncture on (position of) 3rd stria (and farther back than in *fasciatus* group) (p. 427) ..... *quadrillum* group
5. Anterior part of apical striole about half way between suture and margin of elytron; elytral margin not distinctly setulose or serrate 6
— Apical striole close to margin, or obsolete; elytral margin setulose or serrate 8
6. Elytron with 2 dorsal punctures 7
— Elytron with 1 dorsal puncture; (basal sulcus of pronotum with 2

foveae at middle; claws denticulate; form very compact and convex) (p. 473) ..... *haliploides* group

7. Frontal foveae not extending onto clypeus; labrum truncate or moderately emarginate (p. 435) ..... *politus* (incl. *exaratus*) group

— Frontal foveae long, linear, deep, converging anteriorly, extending onto and nearly meeting on clypeus; labrum semi-circularly emarginate (p. 468) ..... *fumicatus* group

8. Apical striole close to margin of elytron; stria 8 present 9

— Apical striole and stria 8 obsolete (p. 472) ..... *acaroides* group

9. Elytral margins setulose but not strongly serrate (p. 476) ..... *nanus* group

— Elytral margins strongly serrate (p. 481) ..... *singularis* group

Tachys serra Group

Tachys serra and its relatives do not fit any of Andrewes' groups of Oriental *Tachys*. In Andrewes' key (1925, pp. 336 ff.) they fall between the *recurvicollis* and *triangularis* (=*fasciatus*) groups, combining (with conspicuous pores on the mentum) antennal segments 2 and 3 subequal with elytral margins strongly serrate, and they differ from both groups in having stria 8 of the elytra deeply impressed for its whole length. However they resemble *T. delicatus* Andrewes, of Singapore, in having the elytra almost fully striate (but stria 8 is obsolete in front in *delicatus*), in position of dorsal punctures of elytra, in serration of elytral margins, and in some other ways. The *serra* group may therefore be derived from a *delicatus*-like, presumably Oriental member of the *fasciatus* group. The *serra* group consists of 3 full species, which occur together in eastern New Guinea (at Dobodura), and several distinct geographical forms in other parts of New Guinea which I am calling subspecies to emphasize their relationships. Outside New Guinea, the group is represented by a relative of *serra* on Morotai Island in the Moluccas, and *serrula* extends to New Britain. The group is not represented in Australia and has no close relatives there. The species of the group are much alike in structure and differ chiefly in size, proportions, and shape of prothorax. I shall therefore describe only one species (*serra*) in detail, and shall compare the other species with it. All the species are found in debris, loose soil, etc. on the ground in damp places in rain forest. They are not primarily associated with open water but sometimes occur in rotten stumps etc. standing in water in swampy places.

Key to New Guinean Species of Tachys of serra Group

1. Broad, prothoracic width/length *c.* 1.39–1.57; large, length 3.0–3.6 (rarely only 2.8) mm. ..... *serra*
   (1a) Base of prothorax relatively narrow (base of prothorax/width of head *c.* 1.40–1.45), and sides of prothorax broadly and rather strongly sinuate before base (p. 405) *serra sensu stricto*
   (1b) Base of prothorax very broad (base of prothorax/width of head *c.* 1.70–1.80), and sides of prothorax broadly but less strongly sinuate (p. 407) ..... (subsp. *latiserra*)
   (1c) Base of prothorax/width of head *c.* 1.51–1.53; sides of prothorax briefly sinuate near base (p. 407) .... (subsp. *breviserra*)

— More slender and/or smaller 2

2. Relatively slender, prothoracic width/length *c.* 1.35-1.37, base of prothorax/width of head *c.* 1.26–1.31; length 2.5–2.7 mm. (p. 408) *tenuiserra*

— Less slender but much smaller; prothoracic width/length *c.* 1.37–1.46; length 1.9–2.4 mm. ..... *serrula*
   (–a) Base of prothorax wider (base of prothorax/width of head *c.* 1.39-1.40); inner wings fully developed (p. 408) ..... *serrula sensu stricto*
   (–b) Base of prothorax narrower (base of prothorax/width of head *c.* 1.31–1.33); inner wings reduced (p. 409) .... (subsp. *inales*

Tachys serra n. sp.

Description. Form of *fasciatus* group but more convex than usual; brown (or reddish or castaneous), appendages paler; slightly iridescent; microsculpture distinct and isodiametric or slightly transverse on head, absent or faint (transverse where visible) on disc of pronotum, absent or faint (sometimes faint indications of very fine transverse lines) on elytra. *Head* rather small, .62, .61, and .59 width prothorax; eyes rather small (compared to *fasciatus*) but convex, with genae behind them short, oblique; antennae normal, segments 2 and 3 subequal, median segments almost 3X long as wide; frontal grooves normal, irregularly subparallel; mentum toothed, with 2 conspicuous pores at base. *Prothorax* transverse-subcordate; width/length 1.39, 1.40, and 1.43; base somewhat narrower than widest part but much wider than apex, base/apex 1.40, 1.40, and 1.41, width of base/width of head 1.40, 1.44, and 1.45; sides rather strongly rounded anteriorly, broadly and rather strongly sinuate before base; apex broadly emarginate; base almost subtruncate (actually broadly but slightly lobed at middle, trending slightly backward at sides); anterior angles rounded; posterior angles acute,

not carinate; lateral margins rather narrow anteriorly, merging with disc posteriorly but not elevated posteriorly, not forming baso-lateral foveae (in *fasciatus* etc. the prothoracic margins are more elevated posteriorly so that rather vague baso-lateral foveae are formed); disc with anterior transverse impression almost obsolete, median line distinct, basal transverse sulcus deep, punctate but without special median foveae. *Elytra* broad, width elytra/width prothorax 1.39, 1.37, and 1.34; humeri prominent, almost (obtusely) angulate; basal margin ending opposite or inside of end of 4th stria; margin conspicuously dentate at and behind humeri, the dentations becoming less conspicuous posteriorly; striation entire (except most striae more or less abbreviated at base and apex); striae punctulate; 8th entire, deep anteriorly, deep and sinuous posteriorly, less deep but still well impressed at middle; apical striole deep, hooked anteriorly between ends 3rd and 4th discal striae; intervals slightly convex, with a few faint, scattered punctules; anterior dorsal puncture on inner edge 5th interval (just outside 4th stria) about ¼ from base, posterior puncture inside apical striole just behind hook. *Inner wings* fully developed. *Lower surface:* prosternum longitudinally impressed; metasternum narrowly margined anteriorly (between middle coxae); lower surface mostly impunctate, not pubescent (except last ventral segment of ♀). *Legs* normal, claws simple. *Secondary sexual characters* normal; ♂ with 2 segments each front tarsus very widely dilated (much wider than in *fasciatus*); ♂ with 1, ♀ 2 setae each side last ventral, the inner pair in ♀ far forward (distant from margin); and ♀ with traces of pubescence on last ventral segment so short, sparse, and inconspicuous that it is easily overlooked even at 100X. *Measurements:* length *c.* 3.2-3.6; width *c.* 1.5-1.7 mm.

Types. Holotype ♂ (M.C.Z. No 30,169) and 14 paratypes from Dobodura, **Papua**, Mar.-July 1944 (Darlington); and 1 additional ♂ paratype from Oro Bay (near Dobodura), Dec. 1943-Jan. 1944 (Darlington); and 1, Brown R., **Papua**, May 25, 1956 (E. J. Ford Jr., Bishop Mus.).

Measured specimens. The ♂ holotype and 2 (♂ ♀) paratypes from Dobodura.

Notes. This very distinct new species represents a new subgroup of *Tachys* characteristic of New Guinea and some adjacent islands. Its relationships to other *Tachys* are discussed above and indicated in preceding keys.

Tachys serra latiserra n. subsp.

Description. Generally similar to typical *serra* but differing in form (fig. 42) and proportions, especially in relatively wider base and less sinuate sides of prothorax. *Head* .55, .56, .56, and .55 width prothorax. *Prothorax:* width/length 1.57, 1.56, 1.52, and 1.57; base/apex 1.63, 1.58, 1.63, 1.63; base of prothorax/-width of head 1.80, 1.70, 1.74, 1.75. *Elytra:* width elytra/width prothorax 1.33,, 1.31, 1.33, 1.35. *Measurements:* length 2.8-3.4; width 1.3-1.5 mm.

Types. Holotype ♂ (M.C.Z. No. 30,170) and 28 paratypes all from Maffin Bay, **Neth. N. G.**, Aug. 1944 (Darlington).

Other material. Sixteen, Hollandia, **Neth. N. G.** July-Sept. 1944 (Darlington); 1, same locality, Nov. 1944 (H. Hoogstraal, M.C.Z.); 6, Aitape, **N-E. N. G.**, Aug. 1944(Darlington). These localities are all in the central part of the north coast of New Guinea. I have also before me one specimen from Madang ("Friedrich-Wilh.-hafen," 1896, Biró, Hungarian National Mus.) intermediate both geographically and structurally between *serra* and *latiserra*. Width of base of prothorax/width of head of this specimen is 1.58.

Measured specimens. The ♂ holotype and 1 ♀ paratype from Maffin Bay, 1 ♂ from Hollandia, and 1 ♂ from Aitape; proportions listed in this order in each case.

Notes. See key and preceding description.

Tachys serra breviserra n. subsp.

Description. Generally similar to typical *serra* and subspecies *latiserra*, but differing in form and proportions especially of prothorax. *Head* .58 and .59 width prothorax. *Prothorax:* width/length 1.53 and 1.54; base/apex 1.45 and 1.47; width of base/width of head 1.53 and 1.51; sides rounded almost to base then briefly sinuate just before basal angles. *Elytra:* width elytra/width prothorax 1.29 and 1.28. *Measurements:* length 3.0-3.3; width 1.2-1.3 mm.

Types. Holotype ♂ (M.C.Z. No. 30,171) and 2 (♂ ♀) paratypes all from Sansapor, Vogelkop, **Neth. N. G.**, Aug. 1944 (Darlington).

Measured specimens. The ♂ holotype and ♀ paratype.

Notes. See key to species of *serra* group.

Tachys tenuiserra n. sp.

Description. Generally similar to *serra* but smaller and more slender (fig. 43); color, faint iridescence, and microsculpture similar. *Head* .64 and .66 width prothorax; details as described for *serra*. *Prothorax* more narrowly subcordate and with relatively narrower base; width/length 1.37 and 1.35; base/apex 1.29 and 1.24; width of base/width of head 1.31 and 1.26; sides arcuate anteriorly, broadly and strongly sinuate before acute posterior angles; other details as described for *serra*. *Elytra:* width elytra/width porthorax 1.40 and 1.49; other details as in *serra*. *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* as in *serra*. *Measurements:* length 2.5-2.7; width 1.0-1.1 mm.

Types. Holotype ♂ (M.C.Z. No. 30,172) and 28 paratypes all from Dobodura, Papua, Mar.-July 1944 (Darlington).

Measured specimens. The ♂ holotype and 1 ♀ paratype.

Notes. Under the microscope, *serra* and the present species are perfectly distinct, but I did not distinguish them in the field and cannot say whether they occur in exactly the same habitats.

Tachys serrula n. sp.

Description. Form of *serra* group (or convex *fasciatus* group); rufous, head (slightly) and elytral discs (more obviously) usually darker, appendages testaceous; microsculpture light and somewhat transverse on head, not distinct on pronotum and elytra, although slight opalescent iridescence suggests unresolved microsculpture. *Head* small, .61 and .63 width prothorax; eyes rather small, somewhat variable in size and convexity; genae oblique or convex in profile; antennae normal, segments 2 and 3 subequal, median segments about 2X long as wide; frontal grooves irregularly subparallel; mentum toothed, with 2 conspicuous pores at base. *Prothorax* transverse-subcordate; width/length 1.46 and 1.46; moderately narrowed in front and behind; base/apex 1.26 and 1.30; width of base/width of head 1.39 and 1.40; sides arcuate in about anterior ¾, sinuate posteriorly; apex broadly emarginate, base subtruncate (modified as usual in group); anterior angles rounded, posterior angles *c.* right, sharp, not carinate; lateral margins narrow, scarcely wider basally; no distinct baso-lateral foveae; disc with anterior transverse line obsolete, median line distinct, basal sulcus deep, irregular or slightly punctulate but without special median foveae.

Elytra rather broad; width elytra/width prothorax 1.34 and 1.39; humeri prominent but rounded; basal margin ending opposite or inside base of 4th stria; margin conspicuously dentate at and behind humeri; striation entire (except most striae abbreviated anteriorly and posteriorly as usual); striae 1 to 7 lightly impressed or represented by rows of moderate punctures; stria 8 deep and entire; apical striole as in *serra;* intervals nearly flat; anterior dorsal puncture on 4th stria at or behind anterior ¼, posterior puncture inside apical striole behind hook. *Inner wings* fully developed in all specimens. *Lower surface* with slight pubescence on last ventral segment. *Legs* normal. *Secondary sexual characters* as in *serra. Measurements:* length 2.0-2.4; width 0.8-1.0 mm.

Types. Holotype ♂ (Hungarian National Mus.) and 150 paratypes (some in M.C.Z., Type No. 30,173) from Madang ("Friedrich-Wilh.-hafen"), **N-E. N. G.**, 1901 (Biró). These specimens were probably taken by sifting, but there is no indication of the habitat.

Other material. **N-E. N. G.**: 48, Stephansort, Astrolabe Bay, 1898 (Biró); 12, Erima, Astrolabe Bay, 1896 (Biró); 4, Hanseman, Astrolabe Bay, 1901 (Biró). **Papua**: 1, Karema, Brown R., Mar. 8-11, 1955 (E. O. Wilson, M.C.Z.), taken in lowland rainforest. Also 7, Cape Gloucester, **New Britain**, Jan.-Feb. 1944 (Darlington).

Measured specimens. The ♂ holotype and 1 ♀ paratype from Madang.

Notes. See key to species of *serra* group.

Tachys serrula inales n. subsp.

Description. Similar to typical *serrula* but differing in proportions and in atrophy of wings. *Head* .62 and .65 width prothorax. *Prothorax:* width/length 1.41 and 1.37; base/apex 1.23 and 1.22; width of base/width of head 1.33 and 1.31; sides arcuate anteriorly and sinuate posteriorly about as in typical *serrula. Elytra:* width elytra/width prothorax 1.33 and 1.40. *Inner wings* reduced in all specimens, *c.* ½ as long as elytra. *Measurements:* length 1.9-2.3; width 0.8-0.9 mm.

Types. Holotype ♂ (M.C.Z. No. 30,174) and 10 paratypes all from Dobodura, **Papua**, Mar.-July 1944 (Darlington).

Measured specimens. The ♂ holotype and 1 ♀ paratype.

Notes. I have no record whether this third, smallest species of the *serra* group occurs in exactly the same habitat as the other species at Dobodura.

Tachys fasciatus Group

The following are noteworthy characters of the *fasciatus* group of *Tachys* in New Guinea (the group is more diverse in some other parts of the world). Form somewhat variable but usually moderately broad and depressed; color variable; reticulate microsculpture variable on front of head (present or absent in different species), usually indistinct on discs of pronotum and elytra, but surface usually faintly iridescent or silky. *Head:* mentum 2-foveate, usually toothed (tooth individually variable); antennae with segment 2 usually slightly longer than 3; frontal grooves moderately impressed, subparallel between eyes, sinuous anteriorly. *Prothorax* usually transversely subcordate; apex subtruncate or broadly emarginate (sometimes vaguely lobed at middle), base usually subtruncate or with weak lobe at middle but more strongly lobed in *sublobatus;* posterior angles variable, not carinate; anterior transverse impression obsolete, middle line finely impressed, basal transverse sulcus deep but sometimes interrupted at middle, usually crenate, with or without a conspicuous fovea at middle. *Elytra* with humeri prominent but rounded (slightly narrowed in species with reduced wings); margins ending inwardly opposite bases of 4th striae, not serrate (margins are serrate in some Oriental species of group); striation variable, usually not entire; 8th stria widely interrupted at middle, the posterior part (behind the principal interruption) entire or nearly so in the larger species, fragmentary in the smaller ones; apical striole well developed, about midway between suture and lateral margin, more or less hooked at tip (anterior end); anterior dorsal puncture usually on or near 4th stria (near 3rd stria in *privus* and on 6th interval in *sericeus,* but latter may not occur in New Guinea), posterior puncture usually inside apical striole behind (not attached to) its hooked tip (fig. 40). *Inner wings* usually fully developed, but reduced in last 2 species. *Lower surface* impunctate; prosternum usually slightly longitudinally impressed; mesosternum narrowly margined anteriorly. *Secondary sexual characters:* ♂ with 2 segments each front tarsus dilated, squamulose below; ♂ with 1, ♀ 2 setae each side last ventral segment, the 2nd (inner) setae in ♀ distant from the margin; and ♀ usually with a little short, sparse, very inconspicuous pubescence on last ventral segment.

The *fasciatus* group of *Tachys* is nearly world-wide in distribution, within the geographical limits of the genus. *Tachys*

fasciatus itself occurs throughout most of the warmer part of the Old World. Apparent representative forms of *Tachys mastersi* occur in eastern Australia, New Guinea, the Moluccas, and the Philippines. The 11 other species of the group in New Guinea are endemic or extend only to the Moluccas or other islands near New Guinea, so far as is known.

Key to Species of Tachys of fasciatus Group of New Guinea

1. Anterior dorsal puncture of elytron not on or near 4th stria 2
— Anterior dorsal puncture of elytron on or near 4th stria 3
2. Anterior dorsal puncture of elytron on 6th interval (p. 412) (*sericeus*)
— Anterior dorsal puncture of elytron near (outside of) 3rd stria (p. 413) ..... *privus*
3. Basal transverse sulcus of pronotum with a distinct fovea at middle; and eyes large or moderate, genae (in profile from above) forming right or nearly right angles with neck; and elytra fasciate or maculate, not unicolorous (except in teneral specimens) 4
— Not as above in one or more ways: basal sulcus of pronotum without distinct median fovea (except individually in *mastersi* subsp.); eyes moderate or small, in latter case forming very obtuse angles with neck; elytra often unicolorous, but sometimes fasciate or maculate. 9
4. At least 6 dorsal striae indicated (outer ones sometimes very faint) on each elytron; front usually with reticulate microsculpture of entire meshes plainly visible at 50X (but faint in *apex*) 5
— Less than 6 dorsal striae indicated on each elytron; front with reticulate microsculpture faint or absent 7
5. Larger, 3.1–3.3 mm.; elytra dark in *c.* basal ⅔ with relatively small post-humeral spots (sometimes almost lacking) and large apical area pale; (3rd and 4th elytral striae almost connected at anterior dorsal puncture) (p. 414) ..... *apex*
— Smaller, 2.2–2.8 mm.; elytra fasciate or 4-maculate with anterior and posterior pale areas *c.* equal 6
6. Prothorax pale; elytral striae slightly more impressed (p. 414) ..... *fasciatus*
— Prothorax dark (as dark or darker than head); elytral striae usually slightly less impressed (p. 416) ..... *fumax*
7. Base of prothorax with broad but distinct lobe set off by strong sinuations (fig. 44) ..... *sublobatus*
   (7a) Base of prothorax slightly narrower than width of head; elytron usually with only the sutural stria well impressed; elytra usually fasciate (p. 418) ..... (*sublobatus s. s.*)
   (7b) Base of prothorax *c.* equal width of head; each elytron with 2 striae well impressed; elytra 2-maculate (dark, each elytron with a pale subapical spot) (p. 420) ..... (subsp. *suffusus*)
— Base of prothorax not abnormally lobed 8

8. Form and size of *fasciatus*, length 2.4–2.9 mm.; pronotum pale (usually paler than head) (p. 417) ..... *sibling*
— More slender and larger, 3.0–3.2 mm.; pronotum dark (or at least not paler than head) (p. 417) ..... *beatus*
9. Elytra broader, more convex, and with wider margins than usual in *fasciatus* group (fig. 45) ..... (*mastersi*)
(9a) Basal area of pronotum (behind posterior transverse sulcus) usually not rugulose; color dark castaneous, often (not always) 2 — maculate with pale (p. 421) ..... (subsp. *pinguis*)
(9b) Basal area of pronotum longitudinally rugulose; color more rufous, not maculate (p. 420) ..... (subsp. *exul*)
— Elytra normal for *fasciatus* group in shape and convexity 10
10. Eyes moderate; inner wings fully developed 11
— Eyes small, the genae forming very obtuse angles with sides of neck; wings often (not always) reduced 12
11. Male with 2 segments each front tarsus widely dilated, 2nd segment much wider than long ..... *masculus*
(11a) Elytra 4-maculate (p. 422) ..... (*masculus s. s.*)
(11b) Color nearly uniform brown or castaneous (p. 423) ..... (subsp. *filius*)
— Male with 2 segments each front tarsus moderately dilated, 2nd segment *c.* wide as long (p. 424) ..... *flavax*
12. Inner wings fully developed; elytra fasciate (p. 424) ..... *luscus*
— Inner wings usually reduced (*c.* ⅔ or ¾ long as elytra); if wings fully developed (individually in *avius*), elytra not fasciate 13
13. Sides of prothorax broadly and strongly sinuate; elytra fasciate or 4-maculate (p. 425) ..... *ambulatus*
— Sides of prothorax briefly sinuate; unicolorous (p. 426) ..... *avius*

(Tachys sericeus Motschulsky)

Motschulsky 1851, Bull. Soc. Nat. Moscou **24**, Part 2, No. 4, p. 507.

Andrewes 1935, Fauna British India, Coleop., Carabidae **2**, pp. 214, 223 (see for additional references and synonymy).

Louwerens 1953, Verhandlungen Naturforschenden Gesellschaft Basel **64**, p. 305.

Description (recognition characters only). A large *Tachys* (3.25-4.0 mm. long) of the *fasciatus* group; reddish or reddish-castaneous with head slightly darker and elytral disc nearly black; anterior dorsal puncture of elytron on 6th interval about ¼ from base.

Type. From "Ind. or."; said by Andrewes to be in Moscow University Mus.

Occurrence in New Guinea. Doubtful.

Notes. The only specimen of *sericeus* that I have seen that purports to be from New Guinea is in the British Mus. labeled "Dorey, Wallace." I have already given reasons (p. 331) for doubting that Wallace's "Dorey" specimens really came from New Guinea. Otherwise the known range of *sericeus* is from northeastern India and Burma to Sumatra, Borneo, and Sumba in the Lesser Sunda Is. The species' closest allies are Oriental.

Tachys privus n. sp.

Description. With characters of *fasciatus* group as here defined. Form average for group; reddish yellow, a transverse post-median elytral fascia slightly darker; shining, faintly iridescent or silky; head without distinct reticulate microsculpture on middle of front but traces of it laterally. *Head* .73 width prothorax, eyes moderate (smaller and less prominent than in *fasciatus*), genae forming slightly obtuse (not quite right) angles with neck; antennae rather short, middle segments about 2X long as wide. *Prothorax* transversely subcordate; width/length 1.51; base/apex 1.12; base/head 1.08; sides arcuate anteriorly, broadly and rather strongly sinuate posteriorly; base and apex subtruncate; posterior angles right and well defined; basal transverse sulcus subcrenulate, with conspicuous longitudinal pore at middle. *Elytra* about ¼ wider than prothorax (E/P 1.23), moderately elongate; 6 discal striae indicated on each elytron, inner ones moderately impressed, outer ones faint; anterior dorsal puncture outside 3rd stria about ⅓ from base. *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* (of ♀) normal; last ventral segment not pubescent. *Measurements:* length *c.* 2.8; width *c.* 0.9 mm.

Type. Holotype ♀ (M.C.Z. No. 30,175) from Dobodura, Papua, Mar.-July 1944 (Darlington); unique.

Measured specimen. The type.

Notes. No other New Guinean species of the *fasciatus* group as here defined has the anterior dorsal puncture of the elytron so near the 3rd stria. In Andrewes' (1925) revision, this species would run to near *zonatus* Putzeys (of Celebes), but *privus* differs from this in a number of ways: sides of prothorax strongly sinuate (not sinuate in *zonatus*), basal sulcus with a conspicuous pore at middle (absent in *zonatus*), etc.

Tachys apex n. sp.

Description. With characters of *fasciatus* group as here defined. Form normal for group; head dark, prothorax pale, elytra dark in *c.* basal ⅔ with (usually) elongate posthumeral marks and (always) a broad apical area pale, appendages pale; moderately shining, slightly iridescent, microsculpture of head faint at middle, more distinct at sides. *Head* .79 and .79 width prothorax; eyes large and prominent; genae short, forming right angles with sides of neck; antennae with median segments *c.* 3X long as wide. *Prothorax* transversely subcordate; width/-length 1.61 and 1.56; base/apex 1.12 and 1.06; base/head 1.01 and .96; sides arcuate anteriorly, converging posteriorly to brief but rather strong basal sinuations; base and apex subtruncate; posterior angles *c.* right, well formed; basal sulcus deep, finely crenulate at sides, interrupted at middle by three elongate pores or sulci. *Elytra* about ⅓ wider than prothorax (E/P 1.31 and 1.36), rather elongate; inner striae well impressed, outer ones including 6th and 7th faint; anterior dorsal puncture about ⅓ from base between 3rd and 4th striae but nearer line of 4th (both 3rd and 4th striae bent toward and attached to the puncture on both elytra of all specimens). *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* normal; ♂ with 2 segments each front tarsus moderately dilated; last ventral segment not pubescent. *Measurements:* length *c.* 3.1-3.3; width 1.3-1.4 mm.

Types. Holotype ♂ (M.C.Z. No. 30,176) and 4 paratypes all from Nadzab, **N-E. N. G.**, July 1944 (Darlington).

Measured specimens. The ♂ holotype and 1 ♀ paratype.

Notes. The large size and general appearance of the present new species suggest *Tachys sericeus* Motschulsky or *venustus* Andrewes of the Orient, but the position of the anterior dorsal puncture of the elytron indicates that the new species is in fact more related to *fasciatus* and its immediate allies.

Tachys fasciatus (Motschulsky)

Trechus fasciatus Motschulsky 1851, Bull. Soc. Nat. Moscou **24**, Part 2, No. 4, p. 506.

Tachys triangularis Nietner 1858, Ann. Mag. Nat. Hist. (3) **2**, p. 422 (*Bembidium*).

Sloane 1921, Proc. Linn. Soc. New South Wales **46**, pp. 196 (elytra), 200 (key), 207.

Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, pp. 342 (key), 350, figs. 3, 14, 19, 22, 30, 34, 35, 38.

Tachys fasciatus Auct. incl. Csiki 1928, Coleop. Cat., Carabidae, Harpalinae 1, p. 178 (see for synonymy and additional references).

Andrewes 1935, Fauna British India etc., Coleop., Carabidae **2**, pp. 213 (key), 217.

Description. None required here. See key above and notes below. Proportions: head/prothorax .72, .73, .76; prothoracic width/length 1.58, 1.60, 1.61, base/apex 1.26, 1.25, 1.16; prothoracic base/width of head 1.13, 1.14, 1.06; width elytra/prothorax *c.* 1.32, 1.38, 1.42. *Measurements:* length *c.* 2.2-2.7; width *c.* 0.8-1.1 mm.

Types. Of *fasciatus,* from "Ind. or.," in Moscow University Zool. Mus.; of *triangularis,* from Ceylon, in Berlin University Zool. Mus.; both seen by Andrewes.

Occurrence in New Guinea. **Papua**: 5, Milne Bay, Dec. 1943 (Darlington); 38, Dobodura, Mar.-July 1944 (Darlington); 15, Oro Bay, Dec. 1943-Jan. 1944 (Darlington); 8, Port Moresby, Oct. 1944 (Darlington). **N-E. N. G.**: 6, Lae, Oct. 1944 (Darlington); 12, Nadzab, July 1944 (Darlington); 19, Chimbu Valley, Bismarck Range, 5,000-7,000 ft., Oct. 1944 (Darlington); 1, Finschhafen, May 12, 1944 (E. S. Ross, California Acad.); 6, Aitape, Aug. 1944 (Darlington). **Neth. N. G.**: 12, Hollandia, July-Sept. 1944 (Darlington), and 5, same locality, Nov. 1944 and Feb. 12 and May 1945 (H. Hoogstraal, Chicago Mus.); 10, Hollandia area, W. Sentani, Cyclops Mts., 50-100 m. (*c.* 150-325 ft.), June 22-24, 1959 (J. L. Gressitt, Bishop Mus.); 5, Maffin Bay, Aug. 1944 (Darlington) and 3, same locality, Sept. 1944 (E. S. Ross, California Acad.); 7, Sansapor (Vogelkop), Aug. 1944 (Darlington). Probably occurs throughout New Guinea at low altitudes and to some extent in the mountains.

Measured specimens. One ♂ ♀ from Dobodura and 1 ♂ from Sansapor (proportions listed in this order in each case).

Notes. This species occurs in parts of **Africa**, through **southern Asia** north to **Japan**, and south and east through the islands to **Australia** (south at least to southern New South Wales), and, east of New Guinea, I have seen it from Cape Gloucester, **New Britain** (Darlington), and Bougainville in the **Solomons** (A. B. Gurney, U.S.N.M.), and it is recorded from **New Caledonia**. It is common in a variety of wet, muddy, and grassy places in open country and sometimes also in forest.

The typical form of *fasciatus,* which is apparently the only form in tropical Asia, is testaceous or ferrugineous with head

darker and (except in unpigmented specimens) a somewhat variable dark fascia across the middle of the elytra, and the apices of the elytra are often slightly darkened too. In New Guinea, however, individuals occur (together with typically colored ones) in which the dark area of the elytra is more or less extended, and in extreme cases the elytra are black with 4 pale blotches. The prothorax is always pale.

Tachys fumax n. sp.

Description. With characters of *fasciatus* group as here defined. Form broad; head reddish brown, pronotum slightly darker especially at sides, elytra testaceous with median fascia and apices dark, the dark color more or less produced along suture and margins (but actual margins pale), appendages pale; rather shining, faintly iridescent; head with distinct isodiametric microsculpture. *Head* .73 and .75 width prothorax; eyes large and prominent (as in *fasciatus*), genae very short and forming right angles with sides of neck; antennae with middle segments *c.* 3X long as wide. *Prothorax* transversely subcordate; width/length 1.60 and 1.61; base/apex 1.20 and 1.16; base/head 1.09 and 1.04 sides arcuate anteriorly, broadly but somewhat variably sinuate posteriorly; base and apex subtruncate; posterior angles *c.* right; basal sulcus crenulate laterally, interrupted at middle by a conspicuous longitudinal pore. *Elytra* wide, E/P 1.41 and 1.39; inner discal striae well impressed, outer ones including 6th faint, 7th not distinctly indicated; anterior dorsal puncture just inside 4th stria *c.* ⅓ from base. *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* normal; ♂ with 2 segments each front tarsus rather widely dilated; last ventral ♀ with a little very fine, short pubescence scarcely visible at *c.* 100X. *Measurements:* length 2.6-2.8; width 1.1-1.2 mm.

Types. Holotype ♂ (M.C.Z. No. 30,177) and 12 paratypes all from Sansapor, **Neth. N. G.**, Aug. 1944 (Darlington).

Other material. Three, southern lowlands of Morotai Is., **Moluccas**, Sept. 1944 (Darlington).

Measured specimens. The ♂ holotype and 1 ♀ paratype.

Notes. This new species is so close to *Tachys fasciatus* that I at first thought it might be a Mendelian color form of that species. The two occur together, without intergradation, both at Sansapor and on Morotai Is. However, the color difference seems to be re-enforced by a slightly lighter striation of *fumax*, and I

am therefore treating the latter as a separate species, although I am not sure of its status.

Tachys sibling n. sp.

Description. With characters of *fasciatus* group as here defined. Form normal for group; yellow, head slightly browner, elytra with a median fascia and apices brown; shining, faintly iridescent; microsculpture of front light, visible but not forming distinct complete isodiametric meshes. *Head* .74 and .76 width prothorax; eyes large and prominent, genae forming right angles with sides of neck; antennae with median segments about 3X long as wide. *Prothorax* transverse-subcordate; width/-length 1.55 and 1.55; base/apex 1.16 and 1.19; base/head 1.06. and 1.05; sides arcuate anteriorly, sinuate (variably) posteriorly; base and apex subtruncate; posterior angles *c.* right; basal sulcus finely crenulate, interrupted at middle by a conspicuous longitudinal pore. *Elytra* rather wide; E/P 1.35 and 1.34; inner discal striae impressed and irregularly subcrenulate, outer striae to 5th lighter, 6th not or scarcely indicated; anterior dorsal puncture inside 4th stria about ⅓ from base. *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* normal; ♂ with 2 segments each front tarsus moderately dilated; ♀ with last ventral segment finely and inconspicuously pubescent. *Measurements:* length 2.4-2.9; width *c.* 0.9-1.2 mm.

Types. Holotype ♂ (M.C.Z. No. 30,178) and 6 paratypes from Dobodura, **Papua**, Mar.-July 1944 (Darlington); and 2 additional paratypes from Oro Bay, near Dobodura, Dec. 1943-Jan. 1944 (Darlington).

Other material. One specimen from Nadzab, **N-E. N. G.**, July 1944 (Darlington) may represent this species or may be a related one.

Measured specimens. The ♂ holotype and 1 ♀ paratype from Dobodura.

Notes. This species is very close indeed to *fasciatus,* from which it differs chiefly as indicated in the preceding key.

Tachys beatus n. sp.

Description. With characters of *fasciatus* group as here defined. Slightly larger and more slender than average for group; head and pronotum dark, elytra strikingly bicolored, yellow

with broad transverse median fascia and apices blackish, the dark color extended along suture and margins, but actual margins pale, appendages yellow; shining, slightly iridescent; front without distinct microsculpture. *Head* .73 and .75 width prothorax; eyes large and prominent, genae forming right angles with sides of neck; antennae with middle segments *c.* 3X (or slightly less) long as wide. *Prothorax* subcordate; width/length 1.50 and 1.49; base/apex 1.11 and 1.04; base/head 1.02 and 0.96; sides arcuate anteriorly, rather strongly sinuate before base; base and apex subtruncate; posterior angles acute (slightly more pointed than right); basal sulcus crenulate, interrupted at middle by a conspicuous elongate pore. *Elytra* rather elongate; about ⅓ wider than prothorax (E/P 1.34 and 1.31); 2 inner discal striae well impressed on each elytron, and 2 or 3 additional striae lightly impressed or faintly indicated; anterior dorsal puncture at basal ⅓ just inside 4th stria. *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* normal; ♂ with 2 segments each front tarsus moderately dilated; last ventral segment not distinctly pubescent or with very slight traces of pubescence in ♀. *Measurements:* length 3.0-3.2; width 1.1-1.2 mm.

Types. Holotype ♂ (M.C.Z. No. 30,179) and 6 paratypes from Aitape, **N-E. N. G.**, Aug. 1944 (Darlington); 4 paratypes from Sansapor, **Neth. N. G.**, Aug. 1944 (Darlington); 1 paratype, Bernhard Camp, **Neth. N. G.**, 50 m. (*c.* 150 ft.) altitude, July-Nov. 1938 (J. Olthof, Louwerens Coll.).

Other material. Three, Dobodura **Papua**, Mar.-July 1944 (Darlington); 2 Nadzab, **N-E. N. G.**, July 1944 (Darlington). These specimens differ slightly from the types in size or proportions or color.

Measured specimens. The ♂ holotype and 1 ♀ paratype from Aitape.

Notes. This rather large and conspicuously marked *Tachys* is distinguished from related forms in the preceding key to species of the *fasciatus* group.

Tachys sublobatus n. sp.

Description. With characters of *fasciatus* group as here defined. Form as figured (fig. 44); slightly more slender than usual; color rather variable, from piceous with elytra 4-plagiate

to reddish yellow with suture and median fascia (together forming a broad cross) and apices of elytra dark brown; appendages pale, antennae sometimes slightly darker; shining, usually not distinctly iridescent but sometimes slightly so; front without distinct reticulate microsculpture. *Head* .74 and .77 width prothorax; eyes large and prominent, genae forming right angles with sides of neck; antennae with middle segments about 3X long as wide; frontal grooves more strongly impressed than usual anteriorly; mentum with or without a tooth, 2-foveate at base as usual in group. *Prothorax* subcordate; width/length 1.48 and 1.47; base/apex 1.10 and 1.03; base/head 0.97 and 0.93; sides arcuate anteriorly, strongly and broadly sinuate posteriorly; apex subtruncate or slightly and broadly emarginate, base broadly and slightly lobed, lobe nearly truncate at middle but ending in rather strong (but brief) sinuations at ends of basal sulcus; posterior angles right or (usually) acute; basal sulcus crenulate, interrupted at middle by a conspicuous elongate pore. *Elytra* rather elongate; about ⅓ or more wider than prothorax (E/P 1.33 and 1.40); usually only one (sutural) stria well impressed but second stria sometimes slightly impressed and one or two additional striae faintly indicated (but this is close to being a 1-striate species). Anterior dorsal puncture about ⅓ from base just inside position of (obsolete) 4th stria. *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* normal; ♂ with 2 first segments each front tarsus moderately dilated; ♀ with last ventral with a little, scarcely detectable, short pubescence. *Measurements:* length 2.2-2.8; width 0.8-1.1 mm.

Types. Holotype ♂ (M.C.Z. No. 30,180) and 19 paratypes from Nadzab, **N-E. N. G.**, July 1944 (Darlington); 6 paratypes from Lae, **N-E. N. G.**, Oct. 1944 (Darlington); and 2 paratypes from Dobodura, **Papua**, March-July 1944 (Darlington).

Measured specimens. The ♂ holotype and 1 ♀ paratype from Nadzab.

Notes. This species probably represents *Tachys cinctus* Putzeys of Amboina, but differs (judging from Andrewes' redescription of *cinctus*, 1925, *Ann. Mus. Civ. Genova* [*Genoa*] **51**, p. 357) in lacking distinct reticulate microsculpture on the head and probably in other details. Moreover, the following new subspecies occurs between areas inhabited by *cinctus* and *sublobatus* and differs from both.

Tachys sublobatus suffusus n. subsp.

Description. Generally similar to typical *sublobatus* but stouter and darker. Color somewhat irregular reddish castaneous with elytra 2-maculate, *i.e.* each elytron with a rather large subapical yellow spot; appendages pale, except basal segments of antennae irregularly darker. *Head* .75 and .75 width prothorax. *Prothorax* relatively broader than in typical *sublobatus* and with relatively broader base; width/length 1.57 and 1.57; base/apex 1.16 and 1.14; base/head 1.03 and 1.02. *Elytra* 1.38 and 1.37 width prothorax, about as in *sublobatus* (or slightly broader) except 2nd stria well impressed for part of its length on disc (rarely so in typical *sublobatus*). *Measurements:* length 2.5-2.8; width 1.0-1.2 mm.

Types. Holotype ♂ (M.C.Z. No. 30,181) and 2 paratypes from Maffin Bay **Neth. N. G.**, Aug. 1944 (Darlington), and 1 additional paratype from same locality, Aug. 1944 (E. S. Ross, California Acad.).

Measured specimens. The ♂ holotype and 1 (M.C.Z.) paratype.

Notes. Sufficiently compared with typical *sublobatus* in the preceding description.

Tachys mastersi exul n. subsp.

Description. With characters of *fasciatus* group as here defined. Head relatively smaller and elytra relatively wider and with wider margins than usual in group; reddish brown, faintly iridescent or silky, front with distinct reticulate microsculpture. *Head* .69 and .71 width prothorax; eyes moderately large and prominent (less so than in *fasciatus*), genae forming obtuse (not quite right) angles with sides of neck; antennae with middle segments slightly more than 3X long as wide. *Prothorax* transversely subcordate; width/length 1.59 and 1.58; base/apex 1.32 and 1.30; base/head 1.22 and 1.19; sides arcuate for most of length, rather weakly (somewhat variably) sinuate toward base; apex subtruncate or broadly emarginate, sometimes slightly lobed at middle; base subtruncate, broadly and slightly lobed; posterior angles usually slightly obtuse (nearly right), slightly blunted; basal transverse sulcus less impressed than usual but distinct and crenulate, usually with a distinct (but variable) longitudinal sulciform impression at middle; area behind sulcus longitudinally rugulose. *Elytra* broader and with sides more

rounded than usual; E/P 1.48 and 1.50; margins unusually broad laterally; 2 or 3 inner discal striae more or less impressed (1st most impressed) and 1 or 2 additional striae indicated especially anteriorly on disc; anterior dorsal puncture about ⅓ from base on (position of) 4th stria. *Inner wings* fully developed. *Lower surface*, *legs*, and *secondary sexual characters* normal; ♂ with 2 segments each front tarsus rather widely dilated; last ventral segment not distinctly pubescent in either sex. *Measurements:* length 2.6-3.0; width 1.2-1.3 mm.

Types. Holotype ♂ (M.C.Z. No. 30,182) and 14 paratypes all from Sansapor (Vogelkop), **Neth. N. G.**, Aug. 1944 (Darlington).

Measured specimens. The ♂ holotype and 1 ♀ paratype.

Notes. Tachys mastersi Sloane ranges (with some variation) in eastern Australia from part of the Cape York Peninsula to southern New South Wales. The present subspecies, although from the farthest end of New Guinea, resembles typical *mastersi* rather closely, differing from it in having slightly better defined basal prothoracic angles, slightly longer antennal segments, and in other minor ways. This species is represented in the main part of New Guinea by another, more distinct subspecies; and there is another form in the Philippines (Leyte). I should add that I am not sure that all these forms really represent a single species. Their adequate study would require much more time than I can give them at present. But to treat them as subspecies now emphasizes their probable relationships in a useful fashion. All the forms occur among dead leaves and other debris by water usually in shady places.

Tachys mastersi pinguis n. subsp.

Description. With characters of *fasciatus* group as here defined. Form as figured (fig. 45); stouter and more convex than usual in group, about as in preceding subspecies except slightly more convex; dark castaneous, often (not always) 2-maculate (each elytron with a more or less distinct reddish-yellow spot about ⅓ from apex); moderately shining, slightly iridescent or silky; head with distinct reticulate microsculpture. *Head* about as in preceding subspecies; .69, .68, and .71 width prothorax. *Prothorax* transversely subcordate; width/length 1.53, 1.53, and 1.60; base/apex 1.17, 1.21, and 1.14; base/head 1.09, 1.12, and 1.07; sides arcuate anteriorly, straight and converging or broadly sinuate posteriorly; posterior angles usually more or

less obtuse, sometimes nearly right; base and apex subtruncate; basal sulcus impressed and crenulate at sides but interrupted at middle, area of interruption usually smooth; basal area of prothorax (behind sulcus) usually smooth, but sometimes (in some Maffin Bay specimens) more or less rugose and with a median-basal longitudinal pore indicated. *Elytra* 1.39, 1.40, and 1.42 width prothorax, a little more convex and with striation fainter than in preceding subspecies. *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* as in preceding subspecies. *Measurements:* length 2.3-2.8; width 1.1-1.3 mm.

Types. Holotype ♂ (M.C.Z. No. 30,183) and 54 paratypes all from Dobodura, **Papua**, Mar-July 1944 (Darlington).

Other material. Eight, Aitape, **N-E. N. G.**, Aug. 1944 (Darlington); 13, Hollandia, **Neth. N. G.**, July-Sept. 1944 (Darlington); 15, Maffin Bay, **Neth. N. G.**, Aug. 1944 (Darlington). Specimens from these localities vary slightly, but hardly enough to justify making additional subspecies.

Measured specimens. The holotype, 1 ♀ paratype from Dobodura, and 1 ♂ from Maffin Bay; proportions listed in this order in each case.

Notes. This very distinct subspecies, or possibly full species, stands geographically between typical *mastersi* of eastern Australia and subspecies *exul* of the Vogelkop. The slightly more convex form, darker color, relatively narrower base of prothorax, and especially the smoother basal area of the pronotum distinguish it from *exul.* The elytral spotting varies individually and geographically. Some specimens from Dobodura are unspotted; others, more or less clearly spotted. Those from Aitape are all unspotted. Those from Hollandia are unspotted or with spots rather vaguely indicated. Those from Maffin Bay are all plainly spotted.

Tachys masculus n. sp.

Description. With characters of *fasciatus* group as here described. Form of average small member of group; brown, elytra 4-maculate (a broad basal area and broad subapical area of each elytron yellow), appendages pale; front with distinct reticulate microsculpture. *Head* .68 and .69 width prothorax; eyes smaller and less prominent than in *fasciatus,* genae forming somewhat obtuse angles with sides of neck; antennae with middle segments about 3X long as wide. *Prothorax* subcordate;

width/length 1.54 and 1.57; base/apex 1.16 and 1.16; base/head 1.14 and 1.12; sides arcuate anteriorly then straight and rather strongly converging almost to base, then briefly sinuate; apex subtruncate or broadly emarginate, base subtruncate (very slightly lobed across middle, slightly oblique at sides); posterior angles obtuse or almost right, slightly blunted; basal sulcus entire, not distinctly crenulate, without a differentiated median pore; basal area (behind sulcus) longitudinally rugose. *Elytra* rather short, more than ⅓ wider than prothorax (E/P 1.38 and 1.38); 2 inner striae lightly impressed on each elytron and 2 or 3 additional striae more lightly or faintly indicated; anterior dorsal puncture on 4th stria about ⅓ from base. *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* normal; ♂ with 2 segments each front tarsus widely dilated, the 2nd segment much wider than long; last ventral of ♀ scarcely detectably pubescent. *Measurements:* length 2.0-2.1; width *c.* 0.9 mm.

Types. Holotype ♂ (M.C.Z. No. 30,184) and 30 paratypes from Maffin Bay, **Neth. N. G.**, Aug. 1944 (Darlington).

Additional material. Five, Hollandia, **Neth. N. G.**, July-Sept. 1944 (Darlington); 1, Aitape, **N-E. N. G.**, Aug. 1944 (Darlington).

Measured specimens. The ♂ holotype and 1 ♀ paratype.

Notes. I cannot say to what other species this is most closely allied; it is sufficiently distinguished from others in the preceding key to species.

Tachys masculus filius n. subsp.

Description. Similar to typical *masculus* (above) but almost unicolorous, without elytral maculae. *Head* .71 and .73 width prothorax. *Prothorax:* width/length 1.61 and 1.54; base/apex 1.20 and 1.20; base/head 1.13 and 1.11. *Elytra:* width elytra/-width prothorax 1.33 and 1.39. Other details, including wide ♂ front tarsi, as in typical subspecies. *Measurements:* length 2.3-2.5; width *c.* 1.0 mm.

Types. Holotype ♂ (M.C.Z. No. 30,185) and 6 paratypes all from Sansapor (Vogelkop), **Neth. N. G.**, Aug. 1944 (Darlington).

Measured specimens. The ♂ holotype and 1 ♀ paratype.

Notes. Sufficiently compared with typical *masculus* in the preceding description.

Tachys flavax n. sp.

Description. With characters of *fasciatus* group as here described. Form of average, slightly depressed member of group; yellow, head not or scarcely darker; surface moderately shining, not or slightly iridescent, slightly silky; front with distinct reticulate microsculpture. *Head* .76 and .74 width prothorax; eyes moderately prominent, genae forming right or slightly obtuse angles with sides of neck; antennae with middle segments 3X or slightly less long as wide. *Prothorax* transverse-subquadrate; width/length 1.61 and 1.62; base/apex 1.15 and 1.13: base/head 1.06 and 1.09: sides arcuate for most of length, rather strongly sinuate near base; base and apex subtruncate; posterior angles right or slightly obtuse, slightly blunted; basal sulcus normally impressed, not distinctly crenate, not interrupted at middle; basal area behind sulcus only slightly roughened. *Elytra* of moderate length; nearly ⅓ wider than prothorax (E/P 1.33 and 1.31); about 5 discal striae on each elytron, inner one slightly impressed, outer ones faint; anterior dorsal puncture on 4th stria about ⅓ from base. *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* normal: ♂ with 2 segments each front tarsus rather narrowly dilated; ♀ with a little sparse inconspicuous pubescence on last ventral. *Measurements:* length 2.0-2.3; width 0.8-0.9 mm.

Types. Holotype ♂ (M.C.Z. No. 30,186) and 6 paratypes all from Port Moresby, **Papua**, Oct. 1944 (Darlington).

Additional material. One ♂, Dobodura, **Papua**, Mar.-July 1944 (Darlington); 1 ♀ Oro Bay (near Dobodura), **Papua**, Dec. 1943-Jan. 1944 (Darlington); 1 ♀, Nadzag, **N-E. N. G.**, July 1944 (Darlington).

Measured specimens. The ♂ holotype and 1 ♀ paratype.

Notes. Very smiliar to *Tachys transversicollis* Macleay of Australia, but *transversicollis* has the anterior dorsal puncture of the elytron on the 5th stria; it is on the 4th in the present species.

Tachys luscus n. sp.

Description. With characters of *fasciatus* group as here defined. Form of small, broad member of group; head brown, prothorax yellow, elytra yellow with very broad submedian fascia brown, the brown color extended in both directions along the suture, appendages pale; surface faintly iridescent or silky;

part of front with distinct reticulate microsculpture. *Head* .69 and .69 width prothorax; eyes considerably reduced in size and prominence, with genae more than half as long as eyes and forming very obtuse angles with sides of neck; antennae with middle segments at least 3X long as wide. *Prothorax* transverse-subcordate; width/length 1.56 and 1.49; base/apex 1.10 and 1.11; base/head 1.10 and 1.09; sides arcuate anteriorly, rather broadly sinuate posteriorly, almost parallel at base; apex broadly emarginate, with angles more advanced than usual; base subtruncate, slightly and broadly lobed; posterior angles almost right; basal sulcus entire, not distinctly crenulate, without distinct median pore; basal area (behind sulcus) longitudinally rugose. *Elytra* broad, about 2/5 wider than prothorax (E/P 1.38 and 1.46); each elytron with 2 inner striae slightly impressed, and 2 or more additional ones faintly indicated; stria 8 fragmentary (as usual in small species of this group); anterior dorsal puncture on or outside 4th stria (the striae are so indistinct that their relation to the puncture is hard to determine), posterior puncture inside striole (farther from striole than usual) behind its hooked tip. *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* (of ♀) normal; ♂ unknown; last ventral segment ♀ with a little short, sparse, inconspicuous pubescence. *Measurements:* length 2.3-2.5; width *c.* 1.0 mm.

Types. Holotype ♀ (M.C.Z. No. 30,187) and 2 (♀ ♀) paratypes all from Hollandia, **Neth. N. G.**, July-Sept. 1944 (Darlington).

Measured specimens. The ♀ holotype and 1 paratype.

Notes. This species may be related to *masculus* (above); in the absence of the ♂ it is difficult to decide about this. However, the present species differs from *masculus* in having smaller eyes, a broader prothorax with more broadly sinuate sides, and the posterior dorsal elytral puncture farther from (inside of) the recurved striole. Moreover the color is different: the prothorax is dark in *masculus*, pale in the present species, and the elytral markings are slightly different.

Tachys ambulatus n. sp.

Description. With characters of *fasciatus* group as here defined. Form of a small, rather slender member of group; head brown, prothorax yellow, elytra yellow with very broad transverse fascia centered slightly before middle and extending in

both directions along suture; surface faintly iridescent and silky; front with distinct reticulate microsculpture. *Head* .66 and .71 width prothorax; eyes reduced and only slightly prominent, genae more than half as long as eyes, forming very obtuse angles with sides of neck; antennae with middle segments almost 4X long as wide. *Prothorax* subcordate but with relatively broad base; width/length 1.45 and 1.41; base/apex 1.19 and 1.16; base/head 1.15 and 1.07; sides arcuate for much of length, then strongly sinuate before base; posterior angles *c.* right; basal sulcus entire, not distinctly crenulate, without median pore; basal area (behind sulcus) longitudinally rugose. *Elytra* moderately long, about ⅖ wider than prothorax (E/P 1.40 and 1.37); 2 or 3 inner striae lightly or irregularly impressed, and striae 4 and 5 indicated at least in part; 8th stria fragmentary; anterior dorsal puncture on or just outside stria 4 about ⅓ from base. *Inner wings* reduced, shorter than elytra (*c.* ¾ elytral length), not folded or slightly folded at tip. *Lower surface, legs,* and *secondary sexual characters* normal; ♂ with 2 segments each front tarsus widely dilated; ♀ with a little short sparse pubescence on last ventral segment. *Measurements:* length 2.4-2.8; width 1.0-1.1 mm.

Types. Holotype ♂ (M.C.Z. No. 30,188) and 13 paratypes all from Aitape, **N-E. N. G.**, Aug. 1944 (Darlington).

Measured specimens. The ♂ holotype and 1 ♀ paratype.

Notes. This may be related to or even a form of *luscus*, but without a ♂ of the latter I cannot be sure.

Tachys avius n. sp.

Description. With characters of *fasciatus* group as here defined. Form of a small, rather slender species of group; brown, head slightly darker, appendages brownish; faintly iridescent or silky; front with rather lightly impressed reticulate microsculpture. *Head* .71 and .69 width prothorax; eyes small and only slightly prominent, genae more than half as long as eyes, forming very obtuse angles with sides of neck; antennae with middle segments about 3X long as wide. *Prothorax* subcordate, width/length 1.52 and 1.56; base/apex 1.21 and 1.19; base/head 1.12 and 1.10; sides arcuate anteriorly, rather strongly converging posteriorly, then moderately sinuate; apex subtruncate or broadly emarginate, slightly lobed at middle, base subtruncate at middle, slightly oblique at sides; posterior angles obtuse (almost right), slightly blunted; basal sulcus entire, not or vaguely crenulate, without median pore; basal area (behind sulcus)

somewhat rugose. *Elytra* rather elongate, slightly more narrowed anteriorly than usual, about ⅓ wider than prothorax (E/P 1.37 and 1.32); each elytron with 2 inner striae slightly impressed, and 2 or 3 additional striae faintly indicated; stria 8 fragmentary; anterior dorsal puncture on 4th stria about ⅓ from base. *Inner wings* dimorphic, reduced in 4 specimens to about ⅔ or ¾ length of elytra and not or slightly folded, but fully developed in 1 ♀ paratype. *Lower surface, legs,* and *secondary sexual characters* normal; ♂ with 2 segments each front tarsus moderately dilated (less so than in *masculus*); ♀ with a little short, sparse, inconspicuous pubescence on last ventral segment. *Measurements:* length *c.* 2.1; width *c.* 0.8 mm.

Types. Holotype ♂ (M.C.Z. No. 30,189) and 4 paratypes all from Dobodura, **Papua**, Mar.-July 1944 (Darlington).

Measured specimens. The ♂ holotype and 1 ♀ paratype.

Notes. This species may represent *masculus,* which is not known to occur in eastern New Guinea, but I am not sure of the relationship. The present species has the ♂ tarsi, especially the 2nd segment, less dilated than in *masculus.* The dimorphism of the inner wings is, taxonomically, a relatively unimportant character.

Tachys quadrillum Group

The *quadrillum* group of *Tachys* is similar to the *fasciatus* group in most characters, but differs as follows: anterior dorsal puncture of elytron on 3rd stria not much before middle (farther back than usual in *fasciatus* group); posterior puncture on (not within) hooked tip of recurved striole (fig. 41) (this character is derived from Hayward's 1899 revision of North American *Tachys*); ♀ with inner subapical setae of last ventral segment nearer margin (more in line with outer setae) than in *fasicatus* etc. Members of the group can often, but not always, be recognized by form (parallel sided) and color (often dark with elytra 4- or 6-maculate or striped with pale). All the species are fully winged, so far as I know.

This group, like the preceding one, is nearly world-wide in distribution, but the species usually occur on salt marshes and in other saline and perhaps alkaline habitats rather than by fresh water. Some of the salt-marsh or coastal species have very wide ranges. They vary in markings and in other characters, and are difficult taxonomically. For these reasons, and because I have seen few specimens from New Guinea, I have not attempted original work in this group but have followed the (not

fully satisfactory) arrangement of species suggested by Andrewes in his 1925 revision of Oriental *Tachys*.

Key to species of Tachys of quadrillum group of New Guinea

1. More slender, elytra more than ½ longer than wide, prothoracic width/length *c.* 1.41; length about 2.5 mm. (p. 428) ..... *queenslandicus*
— Stouter, elytra not more than ½ longer than wide, prothoracic width/length *c.* 1.53-1.59; length usually more than 2.5 mm. 2
2. Elytron with 3 dorsal striae well impressed; (usually larger but measurements overlap) (p. 428) ..... *plagiatus*
— Elytron with 2 dorsal striae well impressed (3 etc. faintly impressed); (usually smaller) (p. 429) ..... *quadrillum*

Tachys queenslandicus Sloane

Sloane 1903, Proc. Linn. Soc. New South Wales **28**, p. 577.
—— 1921, Proc. Linn. Soc. New South Wales **46**, pp. 199, 207.
cruciger Putzeys 1875, Ann. Mus. Civ. Genova (Genoa) **7**, p. 747 (not *cruciger* Bates 1871).
Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, pp. 368, 369.

Description. None required here; see preceding key and following notes. Proportions and measurements of a New Guinean specimen are width head/prothorax .84; prothoracic width/length 1.41, base/apex 1.07, base/head .94; width elytra/prothorax 1.38; total length *c.* 2.3, width *c.* 0.9 mm.

Types. Of *queenslandicus*, from Townsville, Queensland, **Australia**, in the Sloane collection at Canberra (seen by me in 1957); of *cruciger*, from Macassar, **Celebes**, in Genoa Civic Mus. (seen by Andrewes).

Occurrence in New Guinea. The only New Guinean specimens seen or recorded are from "Dor(e)y," **Neth. N. G.** (Wallace); see following notes.

Measured specimen. One ♀, "Dory" (Wallace).

Notes. This species ranges at least from **Celebes** and the **Philippines** to northeastern **Australia**, and it should be widely distributed on salt marshes etc. along the coasts of New Guinea, although the only specimens known from the island are from Wallace's doubtful Dorey material (see p. 331).

Tachys plagiatus Putzeys

Putzeys 1875, Ann. Mus. Civ. Genova (Genoa) **7**, p. 475.
Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, pp. 369, 370.
doddi Sloane 1903, Proc. Linn. Soc. New South Wales **28**, pp. 578, 580.
—— Sloane 1921, Proc. Linn. Soc. New South Wales **46**, pp. 199, 206.

Description. See preceding key, and notes under following species. Proportions and measurements of a New Guinean example are width head/prothorax .73; prothoracic width/length 1.59, base/apex 1.17, base/head 1.13; width elytra/prothorax 1.31; total length 2.7, width 1.1 mm.

Types. Of *plagiatus*, from Macassar, **Celebes**, in Genoa Civic Mus. (seen by Andrewes); of *doddi*, from Townsville, Queensland, **Australia**, in the Sloane collection at Canberra (seen by me in 1957).

Occurrence in New Guinea. **Neth. N. G.**: several, "Dorey" (Wallace). **Papua**: 1, Port Moresby, Oct. 1944 (Darlington). Presumably widely distributed on the island especially near the coast.

Measured specimen. One ♀, Port Moresby.

Notes. The range of this species (including its color varieties, Andrewes 1925) is apparently from **Siam**, **Tonkin**, **Formosa**, and the **Philippines** to northeastern **Australia.**

Tachys quadrillum Schaum

Schaum 1860, Berliner Ent. Zeits. **4**, p. 201.

Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, pp. 369, 372 (see for varieties, which do not concern New Guinea).

—— 1935, Fauna British India etc., Coleop., Carabidae **2**, p. 228 (see for synonymy and additional references).

Description. None needed here. See preceding key and following notes. Proportions and measurements of a "Dorey" example and of one from Lae are width head/prothorax .74 and .73; prothoracic width/length 1.53 and 1.56, base/apex 1.11 and 1.16, base/head 1.03 and 1.09; width elytra/prothorax 1.37 and 1.36; total length *c.* 2.5 and 2.7, width *c.* 1.05 and 1.1 mm.

Type. From **Celebes**, in Genoa Civic Mus. (seen by Andrewes).

Occurrence in New Guinea. **Neth. N. G.**: several, "Dorey." **N-E. N. G.**: 1, Madang ("Friedrich-Wilh.-hafen"), 1896 (Biró); 1, "I. Deslacs" (Garove Is.), 1901 (Biró); 1, Lae, Oct. 1944 (Darlington). **Papua**: 1, Port Moresby, Oct. 1944 (Darlington).

Measured specimens. One (sex?), "Dorey"; 1 ♂, Lae.

Notes. According to Andrewes, this species extends from **Ceylon**, **India**, and southern **China** to **New Guinea**. Also according to Andrewes, this species is close to *plagiatus* (above) but is smaller, with narrower head, flatter eyes, prothorax more constricted behind, and 3rd elytral stria less impressed, but some or

all of these characters are inconstant. However, I think two species are involved. In some localities, *plagiatus* tends to be 6-maculate; *quadrillum*, 4-maculate; but this is not a constant difference either.

Tachys truncatus Group

The *Tachys* of the *truncatus* group are small to minute, brown to yellow (not maculate), and characterized by: mentum with 2 pores (except *truncatus*): eyes minutely pubescent; antennae submoniliform, with segment 2 longer than 3; elytra subtruncate, with margins setulose and finely dentate; only stria 1 impressed, stria 8 reduced to a few widely spaced punctiform impressions, and apical striole absent or abbreviated; 2 dorsal punctures, the anterior usually on (position of) 3rd stria (nearer 4th stria in *exochrias*), the posterior on 3rd stria rather far back; ♂ anterior tarsi not dilated; ♂ with 1, ♀ 2 setae each side last ventral segment, the inner setae in ♀ farther from the margin than the outer pair; last ventral inconspicuously pubescent in both sexes. See *acaroides* group (p. 472) for species that might be confused with *truncatus* and its allies.

Tachys truncatus itself extends from tropical Asia to New Guinea and is probably related to the European *brevicornis* Chaudoir (according to Andrewes) and to *captus* Blackburn of eastern Australia. The other New Guinean species of the group are more restricted in range. The species of this group that I have collected in New Guinea and Australia were found in old stumps and debris on the ground, not specifically near water.

Key to species of Tachys of truncatus group of New Guinea

1. Mentum without foveae (p. 431) ..... *truncatus*
— Mentum with 2 conspicuous foveae at base 2
2. Elytron with sharply impressed apical striole extending forward more than halfway from tip to posterior dorsal puncture of elytron (p. 431) ..... *ochrioides*
— Elytron without distinct apical striole 3
3. Anterior dorsal puncture of elytron near 4th stria; (rather slender, yellow) (p. 432) ..... *exochrias*
— Anterior dorsal puncture of elytron on 3rd stria 4
4. Prothorax with basal angles blunted, sides of base somewhat rounded-oblique (p. 431) ..... (foveate form of) *truncatus*
— Prothorax with basal angles well defined, sides of base truncate 5
5. Dorsal microsculpture indistinct (p. 433) ..... *brachys*
— Dorsal microsculpture distinct (p. 434) ..... *subbrunneus*

Tachys truncatus (Nietner)

Bembidion truncatum Nietner 1858, Ann. Mag. Nat. Hist. (3) **2**, p. 421.
Tachys truncatus Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, pp. 374, 375.
—— 1925, Fauna British India, etc., Coleop., Carabidae **2**, p. 230 (see for synonymy and additional references).

Description (for recognition only). A very small *Tachys* with characters of group (above) except usually without distinct foveae at base of mentum. See preceding key for identification of exceptional individuals with foveate mentum. Proportions: head .78 and .77 width prothorax; prothoracic width/length 1.53 and 1.51, base/apex 1.06 and 1.07, base/head 1.00 and 1.04; width elytra/prothorax 1.30 and 1.28. *Measurements:* length 1.25-1.5; width *c.* 0.5 mm.

Type. From Ceylon, in Berlin Zool. Mus. (*t.* Andrewes).

Occurrence in New Guinea. **Neth. N. G.**: 2, Hollandia, July-Sept. 1944 (Darlington); 5, Maffin Bay, Aug. 1944 (Darlington). **N-E. N. G.**: 12, Stephansort, Astrolabe Bay, 1897 and 1898 (Biró, Hungarian National Mus.); 1, Seleo, Berlinh. (= Aitape), 1896 (Biró, Hungarian National Mus.); 3, Madang ("Friedrich-Wilh.-hafen"), 1896 and 1901 (Biró, Hungarian National Mus.).

Measured specimens. Two ♀ ♀ from Maffin Bay.

Notes. T. truncatus is recorded (by Andrewes 1935) from **Ceylon**, **India**, and **Burma** to **Sumatra**, **Java**, **Borneo**, and the **Philippines**, and I have specimens from Morotai Is., **Moluccas**, and Cape Gloucester, **New Britain**, as well as **New Guinea**. Specimens from New Guinea agree reasonably well with Javan ones. The 3 individuals from Madang are exceptional: one has the mentum conspicuously foveate, the others not; and all have the eyes smaller and flatter than usual in *truncatus*.

A specimen of this species in the U.S.N.M. is labeled "in lily bulb from Japan at Seattle (No. 2747) Wash."

Tachys ochrioides n. sp.

Description. With characters of *truncatus* group as here defined. Slender (in group); entirely testaceous; microsculpture faint. *Head* large (as usual in group), .77 and .78 width prothorax; eyes moderate in size and prominence, genae behind them oblique, forming obtuse angles with neck; antennae more slender than usual in group, middle segments 1½-2X long as wide, segment 2 slightly longer than 3; frontal impressions

short and slight; mentum with 2 conspicuous foveae at base. *Prothorax* transversely subcordate; width/length 1.50 and 1.52; base/apex 1.04 and 1.08; base/head .99 and 1.00; sides rounded in about anterior ¾, broadly sinuate posteriorly; apex broadly emarginate but anterior angles not otherwise advanced; base with very short broad lobe at middle, slightly oblique at sides; basal angles well-defined (slightly blunted), almost right (slightly obtuse); disc with usual impressed lines; basal sulcus entire, not distinctly crenate, but area behind it roughened. *Elytra* subparallel, about ⅓wider than prothorax (E/P 1.36 and 1.34); margins rather strongly but obtusely angulate at humeri, ending inwardly about opposite ends of 4th striae, setulose and finely dentate as usual in group; sutural stria well impressed only apically, faint anteriorly, and other discal striae at most faintly indicated; 8th stria subobsolete except vaguely impressed posteriorly and represented by usual widely spaced punctiform impressions; apical striole sharply impressed but abbreviated anteriorly, not reaching posterior dorsal puncture of elytron; elytron with two dorsal punctures on (position of) 3rd stria, anterior one slightly before middle, posterior one far back, at top of apical declivity, in line with abbreviated apical striole. *Inner wings* fully developed. *Lower surface, legs*, and *secondary sexual characters* normal for group. *Measurements:* length *c.* 2.0; width *c.* 0.75 mm.

Types. Holotype ♀ (M.C.Z. No. 30,190) and 1 ♀ paratype from Nadzab, **N-E. N. G.**, July 1944 (Darlington); and 3 additional paratypes, all from **N-E. N. G.**, as follows: 1, Erima, Astrolabe Bay; 1, Madang (Friedrich-Wilh.-hafen); 1, Stephansort, Astrolabe Bay (these 3 specimens collected by Biró in 1896, 1901, and 1898).

Occurrence in New Guinea. Known only from the types.

Measured specimens. The ♀ holotype and 1 (sex?) paratype from Madang.

Notes. This species is somewhat similar to *Tachys ochrias* Andrewes of India and Burma but is more slender, with better defined posterior prothoracic angles, more angulate humeri, and longer apical elytral strioles.

Tachys exochrias n. sp.

Description. With characters of *truncatus* group as here defined; rather slender (in group); testaceous; microsculpture rather lightly impressed, nearly isodiametric on front, transverse on disc of pronotum (where faint) and elytra. *Head* .74

width prothorax; eyes rather small but still moderately convex, with genae very short, oblique, antennae submoniliform, but middle segments slightly longer than wide, segment 2 longer than 3; frontal grooves short, poorly defined; mentum with 2 foveae at base. *Prothorax* transversely subcordate, rather strongly narrowed behind; width/length 1.54; base/apex 1.13; base/head 1.08; sides rounded anteriorly, almost straight and rather strongly converging posteriorly, briefly sinuate before posterior angles; apex subtruncate or broadly emarginate but anterior angles not otherwise advanced; base with very short broad lobe at middle, slightly rounded-oblique at sides, basal angles somewhat blunted; disc with usual impressed lines, basal transverse sulcus entire, not distinctly crenate, but area behind it roughened. *Elytra* about ⅓ wider than prothorax (E/P 1.35); margins rounded at humeri, ending inwardly about opposite bases 4th striae, setulose and minutely dentate as usual; sutural striae nearly entire, deepest posteriorly; other discal striae indicated; 8th stria obsolete as usual; apical striole almost obsolete; each elytron with 2 dorsal punctures, about ⅓ from base almost on (just inside of) 4th stria, and slightly behind apical ⅓ on 3rd stria. *Inner wings* fully developed. *Lower surface, legs*, and *secondary sexual characters* (of ♀) normal for group. *Measurements:* length 1.6; width 0.6 mm.

Type. Holotype ♀ (M.C.Z. No. 30,191) from Oro Bay, **Papua**, Dec. 1943-Jan. 1944 (Darlington).

Occurrence in New Guinea. Known only from the type.

Measured specimen. The type.

Notes. Although this new species somewhat resembles both *ochrioides* and *ochrias*, it differs from them in lacking a distinct remnant of the apical striole and in having the anterior dorsal elytral puncture nearer the 4th than the 3rd stria; the latter character separates it from all previously known species of the *truncatus* group.

Tachys brachys Andrewes

Andrewes, 1925, Ann. Mus. Civ. Genova (Genoa) **51**, pp. 375, 377.
decolor Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, pp. 375, 378 (new synonymy).

Description. See key, and following notes. Proportions: head .73 and .71 width prothorax; prothoracic width/length 1.53 and 1.53, base/apex 1.11 and 1.16; base/head 1.05 and 1.09; width elytra/prothorax 1.37 and 1.38. *Measurements:* length *c.* 1.5; width *c.* 0.6 mm.

Types. Andrewes described both *brachys* and *decolor* from series without designating single types. However, he selected and marked a "type" for each form in his collection, and I here designate these specimens, selected by Andrewes, as lectotypes. The lectotype (by present designation) of *brachys* is the dark Singapore ("Spore") example mentioned by Andrewes; that of *decolor* is also from Singapore ("Singapore, M. Cameron"); both are in the Andrewes collection, British Mus.

Occurrence in New Guinea. **N-E. N. G.**: 3, Erima, Astrolabe Bay, 1896 (Biró, Budapest Mus.).

Measured specimens. Two (♀ ♀) from Erima.

Notes. "Var." *decolor* seems to be simply a pale form of *brachys*, not primarily geographical, and not worth distinguishing by name. *Tachys brachys,* including *decolor,* is now known to occur in **India** (and perhaps **Ceylon**), southeastern **China** (Ningpo), **Singapore**, **Formosa**, the **Nicobars**, Morotai Is. in the **Moluccas** and **New Guinea**. The species varies not only in color but also in state of wings. Some (most?) individuals are fully winged, but a cotype of *decolor* from Formosa (Takao, H. Sauter) has the wings reduced to unfolded strips about ⅔ as long as elytra, and 3 specimens from Morotai Is. have wings still more reduced, to about ¼ elytral length. (I assign these Morotai specimens to *brachys* with doubt.) The 3 specimens from New Guinea, however, are fully winged.

Tachys subbrunneus n. sp.

Description. With characters of *truncatus* group as here defined. Moderately stout and convex; brown or yellowish brown, appendages testaceous; microsculpture distinct but rather lightly impressed, nearly isodiametric on front, transverse on pronotum and elytra. *Head* .70 and .72 width prothorax; eyes rather small, moderately prominent, genae behind them short and oblique, forming obtuse angles with neck; antennae submoniliform, segment 2 longer than 3; frontal grooves short and poorly defined; mentum conspicuously bifoveate. *Prothorax* transversely subcordate; width/length 1.47 and 1.48; base/apex 1.20 and 1.21; base/head 1.18 and 1.12; sides rounded, broadly and rather strongly sinuate basally; apex subtruncate or broadly emarginate, but anterior angles not otherwise advanced; base with broad short lobe at middle, truncate laterally (or even trending slightly backward), with posterior angles well defined and approximately right; disc with usual impressions, sparsely

and faintly punctulate; basal transverse sulcus entire, not distinctly crenate, but area behind it roughened (somewhat longitudinally so). *Elytra* broad (E/P 1.43 and 1.41), with greatest width behind middle; margins rounded at humeri, ending inwardly about opposite ends of 4th striae, setulose at and behind humeri; apices vaguely subtruncate; sutural striae almost entire (but more deeply impressed posteriorly), other discal striae indicated, stria 8 obsolete except for widely spaced punctiform impressions, apical striole nearly obsolete; dorsal punctures on 3rd stria at about ⅓ and ⅔ of length. *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* normal for group; abdomen with a little fine, inconspicuous pubescence in both sexes. *Measurements:* length 1.3-1.6; width *c.* 0.6 mm.

Types. Holotype ♂ (M.C.Z. No. 30,192) and 15 paratypes from Maffin Bay, **Neth. N. G.**, Aug. 1944 (Darlington); 4 paratypes from Hollandia, **Neth. N. G.**, July-Sept. 1944 (Darlington); and 4 paratypes from Aitape, **N-E. N. G.**, Aug. 1944 (Darlington).

Occurrence in New Guinea. Known only from the types.

Measured specimens. The ♂ holotype and 1 ♀ paratype from Maffin Bay.

Notes. This new species is probably related to *Tachys brunneus* Andrewes of Borneo, which I have not seen, but is apparently a little stouter and more convex, with slightly different frontal furrows (not diverging behind), better impressed sutural striae, and appendages entirely testaceous (outer part of antennae evidently brown in *brunneus*).

Tachys politus (incl. exaratus) Group

Noteworthy characters of the *politus* group in New Guinea are these: form varying from rather narrow and somewhat depressed to very broad and convex (compact), and sometimes fusiform; color varying from testaceous to black, with or without elytral markings; microsculpture variable, often absent or nearly so. *Head:* mentum without foveae; antennae usually of moderate length, rarely submoniliform; frontal foveae short, not extending across clypeus, but otherwise variable. *Prothorax* usually subcordate, but variable; disc usually with vague anterior transverse impression, finely impressed middle line, and variable basal sulcus which is sometimes obsolete. *Elytra* with margin usually broadly rounded (rarely angulate) at humeri,

ending inwardly about opposite bases of 5th or 4th striae, not serrate and not distinctly setulose (at 54X), striation variable, not entire (in New Guinean species); 8th stria variable, usually entire, sometimes interrupted or weakly impressed at middle; apical striole well impressed, rather short, its anterior end about midway between suture and lateral margin, with a strong puncture on its inner side about midway of its length (but somewhat variable in position); 2 dorsal punctures on or inside of (position of) 3rd stria on each elytron. *Inner wings* fully developed (in New Guinean species). *Lower surface:* prosternum usually sulcate; metasternum usually with an arcuate transverse groove behind the process (this character cited from Andrewes, not used here); ventral pubescence usually not distinguishable at 54X but sometimes just visible on last ventral of ♀. *Secondary sexual characters:* ♂ with 2 segments each front tarsus slightly or not dilated, inconspicuously squamulose below; ♂ with 1, ♀ 2 setae each side last ventral segment, the 2nd (inner) setae in ♀ nearly in line with the others.

The *politus* group as here constituted includes Andrewes' *exaratus* group, which was distinguished by Andrewes mainly by the form of the 8th elytral stria, deeply impressed in the *politus* group (as Andrewes defined it), but interrupted or lightly or irregularly impressed in the *exaratus* group. However, there is, in different species in New Guinea, every stage of transition of the 8th stria from interrupted, through almost interrupted, lightly impressed, and moderately impressed but still close to margin, to deeply impressed and bowed away from margin. These differences are useful in distinguishing species, but (in New Guinea) they are hardly good group characters. On the other hand, I have removed from this group one species included by Andrewes in his *exaratus* group. It is *singularis,* here made the type of a new group to which one New Guinean species is assigned.

The *politus* group is world-wide in distribution, or nearly so. Several of the species that occur in New Guinea range rather widely in adjacent areas: *ceylanicus*, from Ceylon, India, and the Philippines to New Guinea; *bembidiiformis*, from Java and the Philippines to Australia; and *aeneus* is known from Celebes and Sumbawa, and *borneensis* from Borneo, as well as from New Guinea. The other 25 species of the group here treated are, so far as known, confined to New Guinea and in some cases to closelying islands. In habits, most members of this group occur on the ground by water or in wet places. Some species, including those

near the beginning and end of the key (*reticulatus* and its allies and *fusiformis* and its allies) live beside running streams, although the exact kind of stream varies with the different species: some prefer large rivers; others, brooks of one sort or another. A number of other species occur beside standing water or simply in wet places. However, at least one species, *aeneus*, although not very different from some of the water-loving ones, is very common under cover on the ground in dry, even in sandy places.

Key to Tachys of politus Group of New Guinea

1. Elytron with less than 4 well impressed dorsal striae, *and* dorsal striae (those present) spaced normally from suture outward 2
— Elytron with at least parts of 4 or more well impressed dorsal (including sutural) striae, *or* striae very irregularly spaced (see couplet 20) 20
2. Head relatively wider, .75 or more width prothorax; stria 8 of elytron sometimes (not always) interrupted at middle; disc of pronotum often (not always) with *isodiametric* microsculpture 3
— Head relatively narrower, .75 or less width prothorax (in borderline cases try both halves of couplet); *and* stria 8 always entire; *and* disc of pronotum with microsculpture (if present) not isodiametric 9
3. Stria 8 interrupted 4
— Stria 8 not interrupted 5
4. Microsculpture of pronotum not isodiametric; form broader (p. 439) *loriae*
— Microsculpture of pronotum isodiametric; form narrower (p. 440) *reticuloides*
5. Elytron with 1 or 2 dorsal striae well impressed, 3rd at most lightly indicated 6
— Elytron with 3 dorsal striae impressed at least in part 8
6. Elytron with 1 (the sutural) stria well impressed, stria 2 less so; (dorsal microsculpture almost lacking); (elytra *c.* ½ or less wider than prothorax) (p. 444) ..... *nepos*
— Elytron with 2 striae well impressed (but 2nd abbreviated at ends) 7
7. Dorsal microsculpture present; elytra less than ½ wider than prothorax (p. 442) ..... *nadzab*
— Dorsal microsculpture absent or nearly so; elytra more than ½ wider than prothorax (p. 443) *fordi*
8. Pronotum with very distinct isodiametric microsculpture; form broader; color testaceous with brown median elytral fascia (p. 441) ..... *reticulatus*
— Pronotum with light or indistinct microsculpture; form narrower; elytra castaneous in most of basal ⅔, testaceous apically (p. 445) ..... *chimbu*

9. Elytron with 3 dorsal (including sutural) striae well impressed, *and* length less than 2 mm.; (color testaceous, elytral striae distinctly punctate) (p. 446) ..... *ceylanicus*
— Elytron usually with less than 3 striae well impressed; *or* if 3-striate, length more than 2 mm. 10
10. Elytron with 2 or 3 dorsal (including sutural) striae impressed at least in part 11
— Elytron usually with only 1 dorsal (the sutural) stria well impressed; other dorsal striae, if present, usually less impressed (in case of doubt, try this half of couplet first, then try preceding half if necessary) 15
11. Dorsal striae and also marginal (9th) stria irregularly punctate or subcrenate; form very robust and compact; (shining, dark, not spotted) (p. 446) ..... *crassus*
— Dorsal and marginal striae not distinctly punctate; form only moderately compact. 12
12. Elytra maculate or fasciate 13
— Elytra unicolorous 14
13. Elytron 2-striate with 3rd stria faint or absent (but if form is rather strongly convex, elytra as well as prothoracic disc virtually without microsculpture, and stria 8 very deep and bowed away from margin before middle, refer to couplet 19) ..... *pictus*
    13a. Paler: usually irregularly testaceous or reddish testaceous with elytral fascia and apices brown; pronotal microsculpture faint or absent (Papua) (p. 447) ..... (*pictus sensu stricto*)
    13b. Darker: reddish testaceous, elytra darker with 4 large pale maculae; pronotal microsculpture more distinct, forming vaguely circular patterns on each side of middle (N-E. N. G.) (p. 449) ..... (subsp. *pictoides*)
    13c. Still darker; piceous, elytra 4-maculate, the spots smaller; pronotal microsculpture as in 13b (Neth. N. G.) (p. 449) (subsp. *subpictus*)
    13d. Darkest: color much like 13c but with elytral spots smaller and the anterior ones obscure; microsculpture as in 13b, c (prothorax less broadly rounded on sides than on other subspecies) (Bismarck Range) (p. 450) ..... (subsp. *reductus*)
— Elytron usually 3-striate, but 3rd stria somewhat variable; (color reddish testaceous with elytral fascia etc. darker) (p. 450) ..... *trinervis*
14. Bicolored, head and prothorax reddish, elytra piceous (p. 451) ..... *divisus*
— Entirely piceous; etc. (p. 452) ..... *par*
15. Prothorax with sides very strongly sinuate well before base, subparallel (or diverging) in posterior 1/6 or 1/5, with basal angles more or less acute 16
— Prothorax with sides only moderately or slightly sinuate 17
16. Larger, length 2.9–3.2 mm. (see also description) (p. 453) ..... *psilus*
— Smaller, length 2.5–2.8 mm. (see also description and esp. notes under this species) (p. 454) ..... *psiloides*

17. Interval 8 narrow, not much wider than reflexed elytral margin . . 18
— Interval 8 wide, about 2X wide as reflexed elytral margin 19
18. Color dark rufous, not spotted (p. 455) . . . . . *milneanus*
— Color dark, elytra 4-maculate (p. 456) . . . . . *parapictus*
19. Sutural stria not quite entire at base; base of prothorax wider than head (base prothorax/head *c.* 1.16) (p. 457) . . . . . *subfumatus*
— Sutural stria entire at base, extending down basal declivity as a distinct fine line; base of prothorax not or scarcely wider than head (p. 458) . . . . . *fumatus*
20. Elytron with striae very irregularly spaced 21
— Elytron with 4 or more normally spaced dorsal striae 22
21. Elytron with parts of sutural and 3 additional dorsal striae, but latter all outside the dorsal punctures (2nd and 3rd striae presumably absent) (p. 460) . . . . . *submutatus*
— Elytron with parts of sutural and 1 additional dorsal stria, but latter about middle of elytral width (it is probably the 5th stria) (p. 461) *mutatus*
22. Elytron with 4 or 5 dorsal striae, but 5th stria (if present) usually less impressed and always much shorter than 4th (p. 462) . . . . *borneensis*
— Elytron with 5 or 6 dorsal striae, 5th about as well impressed and almost as long as 4th 23
23. Elytron with 5 dorsal striae 24
— Elytron with 6 dorsal striae 25
24. Dull (p. 463) . . . . . *aeneus*
— Shining (p. 464) . . . . . *nitens*
25. Not distinctly fusiform; basal sulcus of pronotum moderately impressed 26
— Fusiform; basal sulcus of pronotum usually very lightly impressed or obliterated 27
26. Very convex; shining; dark, elytra 2 maculate (p. 464) *bembidiiformis*
— Less convex; less shining; testaceous (p. 465) . . . . . *senarius*
27. Basal sulcus of pronotum slightly impressed, interrupted and with pore at middle (p. 466) . . . . . *papuae*
— Basal sulcus of pronotum slightly impressed or obsolete, variable but without pore at middle 28
28. Slightly narrower; moderately shining; base of pronotum not much roughened (p. 467) . . . . . *erotyloides*
— Slightly broader (see proportions in descriptions); very dull; base of pronotum subrugose (p. 467) . . . . . *fusiformis*

Tachys loriae Andrewes

Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, pp. 387, 389.

Description. A rather depressed, irregularly testaceous *Tachys* with general characters of *politus* group but with stria 8 of elytron interrupted at middle. See other characters given in

key, above. Proportions: head .78 and .76 width prothorax; prothoracic width/length 1.41 and 1.45, base/apex 1.16 and 1.14, base/head 1.00 and 1.00; width of elytra/prothorax 1.53 and 1.52. *Measurements:* length 2.2-2.7; width 0.8-1.1 mm.

Type. From "Ighibirei" (presumably south coast of **Papua**), July-Aug. 1890 (Loria, Genoa Civic Mus.).

Occurrence in New Guinea. **Papua**: 10, Milne Bay, Dec. 1943 (Darlington). **N-E. N. G.**: 15, Nadzab, July 1944 (Darlington); 5, Lae, Oct. 1944 (Darlington); 2, Stephansort, Astrolabe Bay, 1898 (Biró, Hungarian National Mus.). **Neth. N. G.**: 1, Hollandia, July-Sept. 1944 (Darlington).

Measured specimens. A pair (♂ ♀) from Nadzab.

Notes. This is, I think, a stream-side species, but I cannot give its exact habitat.

Tachys reticuloides n. sp.

Description. With characters of *politus* group as here defined. Slender and depressed within group; testaceous, with sutural area, median transverse fascia, and apices of elytra browner; rather dull, microsculpture distinct, isodiametric on front and pronotum, but with individual meshes less distinct and somewhat transverse on elytra. *Head* .82 and .81 width prothorax; eyes rather large and prominent (in group), genae forming *c.* right angles with neck; antennae with median segments nearly 2X long as wide, segments 2 and 3 subequal; frontal grooves short, shallow, subparallel. *Prothorax* subcordate; width/length 1.45 and 1.45; base/apex 1.11 and 1.20; base/head .96 and 1.00; sides broadly rounded anteriorly, sinuate well before basal angles; apex broadly emarginate but anterior angles not otherwise advanced; base subtruncate at middle, slightly oblique at sides; lateral margins narrow; basal angles slightly obtuse but well defined, subcarinate; disc rather depressed, with usual impression; basal sulcus rather shallow but entire and not distinctly crenate. *Elytra* rather elongate, about ½ wider than prothorax (E/P 1.48 and 1.53); margins rounded at humeri; each elytron with 3 discal striae rather irregularly impressed, and additional striae indicated; stria 8 rather narrowly interrupted before middle; 3rd stria with 2 dorsal punctures at about ⅓ and ⅔ of elytral length. *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* normal; 2 segments each front tarsus ♂ distinctly dilated; last ventral segment scarcely visibly pubescent in ♀. *Measurements:* length 1.7-2.1; width *c.* 0.6-0.8 mm.

Types. Holotype ♂ (M.C.Z. No. 30,193) and 14 paratypes from Dobodura, **Papua**, Mar.-July 1944 (Darlington); and additional paratypes as follows. **Papua**: 9, Oro Bay (near Dobodura) Dec. 1943-Jan. 1944 (Darlington); 3, Kokoda, Apr. and July 1933 (Cheesman); 9, Milne Bay, Dec. 1943 (Darlington). **N-E. N. G.**: 19, Nadzab, July 1944 (Darlington); 3, Lae, Oct. 1944 (Darlington); 2 Stephansort and 1 Erima, Astrolabe Bay, 1898 and 1896 (Biró, Hungarian National Mus.); 5, Sambeang, Mongi Watershed, Huon Peninsula, 400 m. (*c.* 1,300 ft.), Apr. 21, 1955 (E. O. Wilson, M.C.Z.); 1, Chimbu Valley, Bismarck Range, 5000-7500 ft., Oct. 1944 (Darlington).

Measured specimens. The ♂ holotype and 1 ♀ paratype from Dobodura.

Notes. This new species seems rather closely related to *reticulatus*, below, but the present species is more slender, with relatively slightly larger head, and stria 8 of elytron distinctly interrupted.

Tachys reticulatus Andrewes

Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, pp. 387, 388.

Description. A moderately broad, not very convex, irregularly testaceous, dull member of *politus* group, with stria 8 lightly impressed and almost interrupted at middle. Proportions: head .77 and .78 width prothorax; prothoracic width/-length 1.48 and 1.44, base/apex 1.15 and 1.19, base/head 1.01 and 1.04; width elytra/prothorax 1.44 and 1.44. *Measurements:* length 2.0-2.2; width *c.* 0.8-0.9 mm.

Types. Described from 5 specimens from "Dilo" and 3 from "Kapakapa" (all collected by Loria). The actual type is in the Genoa Civic Mus.; "cotypes," in the British Mus. Kapakapa is on the south coast of **Papua**, southeast of Port Moresby. Dilo is probably in the same general area, but I have not located it exactly.

Occurrence in New Guinea. Apparently confined to **Papua**: besides cotypes, I have seen 31, Dobodura, Mar.-July 1944 (Darlington); and 12, Oro Bay, Dec. 1943-Jan. 1944 (Darlington).

Measured specimens. One pair (♂ ♀) from Dobodura.

Notes. I have compared a specimen from Dobodura with a Dilo "cotype" at the British Mus., and it agreed very well. This and the preceding species both occur at Dobodura, but whether they actually live together (beside running streams)

or in slightly different habitats I do not know. I did not distinguish them in the field.

Tachys nadzab n. sp.

Description. A rather slender, moderately convex member of *politus* group as here defined. Color irregularly testaceous with suture, median fascia, apices, and especially lateral margins of elytra browner; moderately shining, microsculpture rather faint, isodiametric on head and pronotum, more transverse on elytra. *Head* .78 and .79 width prothorax; eyes moderately large and prominent, genae forming *c.* right angles with neck; antennae with median segments slightly less than 2X long as wide, segments 2 and 3 subequal (or 3 slightly longer); frontal foveae rather short, moderately impressed. *Prothorax* subcordate; width/length 1.38 and 1.39; base/apex 1.19 and 1.20; base/head 1.04 and 1.02; sides broadly rounded through much of length, moderately sinuate before base; apex subtruncate with anterior angles not advanced; base subtruncate at middle, slightly oblique at sides; posterior angles slightly obtuse but distinct, carinate; disc with anterior impression almost obsolete, middle line normally impressed; basal sulcus moderately impressed, slightly or not crenate but interrupted and with a fovea at middle; basal area (behind sulcus) more strongly reticulate than disc of pronotum. *Elytra* less than ½ wider than prothorax (E/P 1.42 and 1.41); margins rounded at humeri; each elytron with 2 moderately impressed dorsal striae, additional striae faintly indicated; stria 8 entire but rather lightly impressed before middle, not bowed away from margin; 2 dorsal punctures on or near each 3rd stria behind basal ⅓ and before apical ⅔. *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* normal; ♂ with 2 segments each front tarsus scarcely dilated; last ventral not distinctly pubescent in either sex. *Measurements:* length 2.0-2.1; width *c.* 0.8 mm.

Types. Holotype ♂ (M.C.Z. No. 30,194) with 12 paratypes from Nadzab, **N-E. N. G.**, July 1944 (Darlington); 1 paratype from Stephansort, Astrolabe Bay, 1898 (Biró, Hungarian National Mus.); and 1 paratype from Lower Busu R., Huon Peninsula, May 12, 1955 (E. O. Wilson, M.C.Z.), taken in lowland rain forest.

Measured specimens. The ♂ holotype and 1 ♀ paratype from Nadzab.

Notes. This species represents the beginning of transition from the more depressed *reticulatus* etc. toward the more convex form usual in the *politus* group. I think it lives by running water, but under just what circumstances I cannot say.

Tachys fordi n. sp.

Description. With characters of *politus* group as here defined. Form about average for group except head and prothorax relatively narrower and elytra wider than usual; rather convex; irregularly piceous or dark rufous, not spotted, legs testaceous, antennae and palpi irregularly brownish; shining, upper surface without reticulate microsculpture or virtually so. *Head* .79 and .75 width prothorax; eyes rather large and prominent, genae forming *c.* right angles with neck; antennae with median segments about 2X long as wide, segment 3 slightly longer than 2; frontal grooves short but deep. *Prothorax* transverse-subcordate; width/length 1.48 and 1.48; base/apex 1.18 and 1.18; base/head 1.00 and 1.02; sides rounded anteriorly, moderately sinuate toward base; apex broadly emarginate but anterior angles not otherwise advanced; base subtruncate, slightly oblique toward sides; lateral margins moderate; basal angles *c.* right, well defined, carinate; disc normally convex, with usual rather weak anterior transverse impression and longitudinal middle line; basal sulcus well impressed, not or slightly crenate, interrupted and with a conspicuous pore at middle. *Elytra* more than ½ wider than prothorax (E/P 1.62 and 1.58), subparallel at middle, with rounded humeri; each elytron with 2 well impressed striae, sutural one entire, 2nd much abbreviated at both ends; stria 8 entire and well impressed but not bowed away from margin; each 3rd interval with 2 well impressed dorsal punctures at or just before ⅓ and ⅔ of elytral length. *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* normal; 2 segments each front tarsus ♂ slightly dilated. *Measurements:* length 2.7-3.1; width 1.1-1.3 mm.

Types. Holotype ♂ (Bishop Mus.) and 5 paratypes (2 in M.C.Z. No. 30,309) all from Sepalakambang, Salawaket Range, **N-E. N. G.**, 1920 m. (*c.* 6240 ft.), Sept. 12, 1956 (E. J. Ford Jr., collector).

Measured specimens. The ♂ holotype and 1 ♀ paratype.

Notes. Although this species runs to near *nepos* and *nadzab* in the key to species (p. 437), I am not sure it is related. It may really be more closely related to *pictus* etc. However it is

distinguished from all these species by the relatively wide elytra in relation to prothorax, and from most of them also by the shining upper surface, without distinct reticulate microsculpture. Its habits are not recorded.

One specimen (the type) has an extra dorsal puncture on the third interval of the left elytron only, near the top of the declivity. This is presumably simply an abnormality.

Tachys nepos n. sp.

Description. With characters of *politus* group as here defined. Form about average, rather convex; testaceous, elytra darker with large posthumeral and smaller subapical pale spots; shining, almost without microsculpture dorsally. *Head* .80 and .76 width prothorax; eyes moderately large and prominent, genae forming *c.* right angles with neck; antennae rather stout (in group), median segments about 1½X long as wide, and segment 2 and 3 subequal; frontal grooves short, well impressed, almost punctiform. *Prothorax* subcordate; width/length 1.43 and 1.48; base/apex 1.16 and 1.18; base/head 1.02 and 1.06; sides arcuate then almost straight and converging behind middle, then rather broadly sinuate posteriorly; apex subtruncate with anterior angles not advanced; base subtruncate at middle, sinuate laterally; posterior angles well defined, obtuse or almost right, briefly carinate; disc rather strongly convex, impressed as usual; basal transverse sulcus well impressed, not distinctly crenate, but interrupted at middle and with median fovea. *Elytra* of moderate length, rather strongly convex, about ½ or less wider than prothorax (E/P 1.53 and 1.40); margins rounded at humeri; each elytron with sutural stria nearly entire and 2nd stria faintly indicated; stria 8 entire, rather deep, slightly bowed away from margin before middle; apical striole normal for group; 2 dorsal punctures on position of 3rd stria about ⅓ from base and behind middle. *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* normal; ♂ with 2 segments each front tarsus scarcely dilated. *Measurements:* length 1.8-2.0; width *c.* 0.8 mm.

Types. Holotype ♂ (M.C.Z. No. 30,195) and 1 ♂ paratype both from Nadzab, **N-E. N. G.**, July 1944 (Darlington); and 1 additional paratype (sex?), Erima, Astrolabe Bay, 1896 (Biró, Hungarian National Mus.).

Measured specimens. The holotype and the paratype from Erima.

Notes. If this species is properly placed in the first half of couplet 2, it will key out easily (in preceding key), but if individuals should occur with relatively slightly narrower heads, they would go to the second half of couplet 2 and would probably run to near *subfumatus*, from which *nepos* differs in color, proportions, and size.

Tachys chimbu n. sp.

Description. With characters of slender member of *politus* group as here defined. Color reddish testaceous, head and most of basal ⅔ of elytra (and also extreme apices of elytra) darker, elytra with rather vague posthumeral spots and most of apical ⅓ pale; rather shining, microsculpture lightly impressed, isodiametric (when distinguishable) on front and pronotum, probably more transverse on disc of elytra (but individual meshes difficult to distinguish). *Head* wide (in group), .86 and .83 width prothorax; eyes moderately large and prominent, genae forming *c.* right angles with neck; antennae with median segments about 2X wide as long, segments 2 and 3 subequal; frontal foveae rather short, not sharply defined. *Prothorax* subcordate; width/length 1.38 and 1.38; base/apex 1.14 and 1.15; base/head .92 and .93; sides broadly rounded, then rather broadly sinuate before base; apex subtruncate with anterior angles not advanced; base subtruncate or slightly lobed at middle, slightly oblique or sinuate at sides; posterior angles well defined, slightly obtuse or almost right, very briefly or not carinate; disc rather weakly convex, with usual impressions; basal sulcus entire, not distinctly interrupted, or subinterrupted and subfoveate at middle. *Elytra* long, ½ or more wider than prothorax (E/P 1.51 and 1.56) margins rounded at humeri; elytron with 3 discal striae impressed at least in part, but other striae hardly indicated; stria 8 entire, not bowed away from margin; apical striole normal for group; 2 dorsal punctures on 3rd stria about ⅓ and ⅔ from base. *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* normal; ♂ with first 2 segments front tarsus scarcely dilated; ♀ with very slight, short, sparse pubescence on last ventral barely visible at 54X. *Measurements:* length 2.0-2.4; width *c.* 0.8-0.9 mm.

Types. Holotype ♂ (M.C.Z. No. 30,196) and 24 paratypes all from Chimbu Valley, Bismarck Range, **N-E. N. G.**, Oct. 1944 (Darlington).

Measured specimens. The ♂ holotype and 1 ♀ paratype.

Notes. The specimens were taken in the open part of the valley, probably beside running water. The narrow form, relatively large head, coloration, and other characters given in the key make this an easily identified species.

Tachys ceylanicus (Nietner)

Nietner 1858, Ann. Mag. Nat. Hist. (3) **2**, p. 423 (*Bembidium*).
Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, pp. 404, 436.
—— 1935, Fauna British India etc., Coleop., Carabidae **2**, pp. 246, 257.
Britton 1948, Proc. Hawaiian Ent. Soc. **13**, pp. 235, 239 (see this and preceding references for synonymy etc.).

Description (for recognition only). A small, testaceous species, of about average form and convexity (for *politus* group), with 3 dorsal striae impressed and punctate on each elytron, virtually no dorsal microsculpture, and other characters given in the key. *Inner wings* fully developed. Proportions of specimen from New Guinea: head .74 width prothorax; prothoracic width/length 1.38, base/apex 1.16, base/head 1.07; width elytra/prothorax 1.33. *Measurements:* length 1.9; width .75 mm.

Types. From Ceylon, in Berlin Zool. Mus. (seen by Andrewes). Synonyms of this species are based on specimens from Ceylon, "Ind. Or.," and Hawaii.

Occurrence in New Guinea. One ♀, Hollandia, **Neth. N. G.**, May 1945 (B. Malkin, U.S.N.M.).

Measured specimen. The Hollandia ♀.

Notes. According to Andrewes (1935), *ceylanicus* occurs from **Ceylon**, **India**, **Burma**, etc. to **Sumatra**, **Java**, **Celebes**, and the **Philippines**, and I have a series from Morotai Is. in the **Moluccas**, while the present record extends the species' range to New Guinea. It apparently occurs in debris in damp places on the ground, but I cannot define its habitat further. It is presumably introduced in Hawaii. Four specimens in the U.S.N.M. are labeled "alive in packing of palm seeds — Sidpor (nr. Calcutta) INDIA — Wash. D.C. Oct. 10, 1934 A27784."

Tachys crassus n. sp

Description. With characters of *politus* group as here defined. Very stout and convex; piceous, lateral margins of prothorax and elytra rufous, appendages irregularly testaceous-infuscate; shining, dorsal surface virtually without microsculpture. *Head* .67 and .70 width prothorax; eyes moderately large and prominent, genae forming *c.* right angles with neck; antennae rather

stout, median segments not much more than 1½X long as wide, segment 3 slightly longer than segment 2; front slightly depressed between eyes (or neck swollen); frontal grooves short but deeply impressed. *Prothorax* broadly subcordate; width/-length 1.57 and 1.48; base/apex 1.16 and 1.20; base/head 1.14 and 1.13; sides very strongly rounded anteriorly, broadly but not strongly sinuate before base; apex subtruncate, anterior angles not advanced; base subtruncate at middle, slightly sinuate or oblique at sides; lateral margins wide; posterior angles obtuse but distinct, carinate; disc very convex, with anterior transverse impression weak, middle line fine; basal transverse sulcus impressed, crenulate especially toward middle, with a conspicuous fovea at middle. *Elytra* very broad and convex, almost ½ wider than prothorax (exact measurement impossible because elytra slightly spread); margins rounded at humeri; each elytron with 2 discal striae impressed at least in part, punctate; 3rd stria faint; stria 8 entire, slightly bowed away from margin before middle; stria 9 (marginal stria) crenate; apical striole normal for group; two dorsal punctures on or inside of position of 3rd stria about basal ¼ and behind middle. *Inner wings* fully developed. *Lower surface*, *legs*, and *secondary sexual characters* (♂) normal; two basal segments each ♂ front tarsus very slightly dilated; ventral pubescence absent (in ♂). *Measurements:* length *c.* 2.4; width *c.* 1.15 mm.

Types. Holotype ♂ (M.C.Z. No. 30,197) and 1 ♂ paratype both from Chimbu Valley, Bismarck Range, **Neth. N. G.**, 5000-7500 ft., Oct. 1944 (Darlington).

Measured specimens. The types.

Notes. This species does not seem to be directly related to any other known in New Guinea. It occurred in generally open country, not forest, but I have no record of its exact habitat.

Tachys pictus Andrewes

Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, pp. 405, 439.
mediocris Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, pp. 405, 442 (new synonymy).

Description. With characters of *politus* group as here defined. Form of about average width and convexity; color irregular testaceous or brown, with median fascia and apices of elytra much darker (or elytra could be described as dark brown with four very large pale maculae); shining, microsculpture faint (isodiametric) on front, absent or virtually so on discs of

pronotum and elytra. *Head* .73 and .72 width prothorax; eyes moderately large and prominent, genae forming *c.* right angles with neck; antennae with median segments about 2X long as wide; segments 2 and 3 subequal; frontal grooves short, moderately impressed. *Prothorax* subcordate; width/length 1.41 and 1.39; base/apex 1.21 and 1.18; base/head 1.10 and 1.09; sides broadly rounded anteriorly, nearly straight and converging almost to base, then briefly sinuate; apex subtruncate or very broadly emarginate, with anterior angles not otherwise advanced; base irregularly subtruncate, very slightly oblique at sides; posterior angles *c.* right or slightly obtuse, carinate; disc moderately convex, with anterior transverse impression faint and middle line fine (as usual) and basal sulcus moderately impressed, at most faintly punctulate, interrupted at middle and with median fovea. *Elytra* less than ½ wider than prothorax (E/P 1.46 and 1.43); margins broadly rounded at humeri; each elytron with 2 dorsal striae well impressed at least in part, other dorsal striae faint or absent; stria 8 entire, rather deep, but not much bowed away from margin; apical striole normal for group. *Inner wings* fully developed. *Lower surfaee, legs,* and *seeondary sexual characters* normal: ♂ with 2 segments each front tarsus slightly dilated; ventral pubescence (if any) scarcely distinguishable at 54X. *Measurements:* length 2.4-2.9; width 1.0-1.2 mm.

Types. Of *pictus,* from Rigo, and of *mediocris,* from Kapakapa; both localities are on the south coast of **Papua**, southeast of Port Moresby; both types were collected by Loria, and both are in the Genoa Civic Mus. Cotypes of both species are in the British Mus., where I have examined them.

Oecurrence in New Guinea. **Papua**: 48, Dobodura, Mar.-July 1944 (Darlington); 7 Oro Bay, Dec. 1943-July 1944 (Darlington); 2, Kokoda, Aug. 1933 (Cheesman); 29, Milne Bay, Dec. 1943 (Darlington). Other subspecies occur in **N-E. N. G.** and **Neth. N. G.** (see below). However 2 specimens in the series do not fit into my geographical classification. One, from Buna, Papua, Oct. 28, 1943 (W. B. Jones, borrowed from Dr. Manson Valentine), is within the geographical area of typical *pictus* but is darker than the latter, with smaller elytral spots and visible prothoracic microsculpture. The other, from Maffin Bay, **Neth. N. G.**, Aug. 1944 (Darlington) has the characters of true *pictus* but is far outside the latter's Papuan range.

Measured speeimens. Two (♂ ♀) from Dobodura.

Notes. Andrewes did not compare his two species with each other, but he compared both with *poecilopterus,* and I have little doubt that they both represent the Papuan form of the present species, which varies somewhat (individually) in color and striation. The type localities of *pictus* and *mediocris* are close together, and both species are described as having "no microsculpture."

Tachys pictus pictoides n. subsp.

Description. Similar to typical *pictus* but slightly broader, darker, and with more distinct microsculpture: head and prothorax rather dark reddish, elytra piceous each with two rather large testaceous spots extending inward about to stria 2 and outward almost to margin. Microsculpture light but visible on front (isodiametric) and pronotum (somewhat transverse and tending to form circular patterns on each side), not distinct on disc of elytra but probably present as very fine transverse lines which tend to give surface a silky lustre in some lights. Proportions: head .72 and .74 width prothorax; prothoracic width/length 1.47 and 1.46, base/apex 1.26 and 1.23, base/head 1.13 and 1.09; width of elytra/prothorax 1.45 and 1.43. *Measurements:* length 2.4-2.7; width 1.1-1.2 mm.

Types. Holotype ♂ (M.C.Z. No. 30,198) and 32 paratypes from Nadzab, **N-E. N. G.**, July 1944 (Darlington). Also additional paratypes from **N-E. N. G.** as follows: 1, Lae, Oct. 1944 (Darlington); 1, lower Busu R., Huon Peninsula, Mar. 27, 1955, in lowland rain forest (E. O. Wilson #706, M.C.Z.); 1, Erima, Astrolabe Bay, 1896 (Biró, Hungarian National Mus.).

Measured specimens. The ♂ holotype and 1 ♀ paratype from Nadzab.

Notes. Sufficiently compared with typical *pictus* in the preceding description.

Tachys pictus subpictus n. subsp.

Description. Similar to the preceding (*pictoides*) in structure and microsculpture, but differing in color: irregularly piceous, with especially head and prothorax darker than in preceding subspecies, and with elytral spots smaller, the anterior spots hardly extending inward to position of 3rd stria (posterior spots reach about 2nd stria), and neither spots reaching the margin. Proportions:: head/prothorax .74 and .75; prothoracic

width/length 1.47 and 1.48, base/apex 1.19 and 1.17, base/head 1.06 and 1.05; width elytra/prothorax 1.49 and 1.41. *Measurements:* length 2.7-3.0; width 1.1-1.2 mm.

Types. Holotype ♂ (M.C.Z. No. 30,199) and 12 paratypes from Hollandia, **Neth. N. G.**, July-Sept. 1944 (Darlington); 1 paratype, Hollandia area, W. Sentani, Cyclops Mts., 50-100 m. (c. 150-325 ft.), June 22-24 (J. L. Gressitt, Bishop Mus.).

Measured specimens. The ♂ holotype and 1 ♀ paratype from Hollandia.

Notes. Sufficiently compared (with *pietoides*) above. See also comparisons in description of following subspecies.

Tachys pictus reductus n. subsp.

Description. Generally similar to the two preceding subspecies but still darker, piceous or reddish piceous with anterior elytral spots vague (indicated by rather faint reddish areas rather than distinct blotches) and posterior spots small and sometimes vague too. Proportions: head .74 and .73 width prothorax; prothoracic width/length 1.45 and 1.44, base/apex 1.27 and 1.25, base/head 1.09 and 1.11; width elytra/prothorax 1.47 and 1.53. *Measurements:* length *c.* 3.0; width *c.* 1.25 mm.

Types. Holotype ♂ (M.C.Z. No. 30,200) and 11 paratypes all from Chimbu Valley, Bismarck Range, **N-E. N. G.**, Oct. 1944 (Darlington).

Measured specimens. The ♂ holotype and 1 ♀ paratype.

Notes. Comparison given above should be sufficient.

Tachys trinervis n. sp.

Description. With characters of *politus* group as here defined. Form about average for group, not strongly convex; testaceous or reddish testaceous with broad median elytral fascia and apices dark brown (or elytra could be described as dark brown with 4 very large pale maculae); rather shining, microsculpture faint on head (isodiametric) and pronotum (transverse, tending to form partly circular patterns on each side), not distinguishable at 54X on elytra. *Head* .71 and .71 width prothorax; eyes moderately large and prominent, genae forming *c.* right angles with neck; antennae with middle segments *c.* 2X long as wide; frontal grooves rather short, moderately impressed. *Prothorax* broadly subcordate; width/length 1.42 and 1.46; base/apex 1.27 and 1.27; base/head 1.12 and 1.16; sides broadly rounded

anteriorly, moderately sinuate posteriorly; apex subtruncate or very broadly emarginate, with anterior angles not otherwise advanced; base subtruncate, very slightly oblique at sides; posterior angles c. right, briefly carinate; disc with usual faint anterior transverse impression and fine median line; basal sulcus moderately impressed, finely crenate, interrupted at middle and with a median fovea. *Elytra* rather broad, width elytra/prothorax 1.43 and 1.42; margins rounded or faintly angulate at humeri; each elytron usually with 3 dorsal striae well impressed at least in part, but 3rd stria somewhat variable, and additional dorsal striae very faint or absent; stria 8 entire, only slightly bowed away from margin before middle; 2 dorsal punctures on or just inside 3rd stria just before ⅓ and ⅔ of elytral length. *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* normal: ♂ with 2 basal segments each front tarsus slightly dilated; ventral pubescence scarcely distinguishable at 54X. *Measurements:* 2.5-3.0; width 1.0-1.25 mm.

Types. Holotype ♂ (M.C.Z. No. 30,201) and 24 paratypes from Lae, **N-E. N. G.**, Oct. 1944 (Darlington); 1 additional paratype, Stephansort, Astrolabe Bay, 1898 (Biró, Hungarian National Mus.).

Measured specimens. The ♂ holotype and 1 ♀ paratype from Lae.

Notes. This species is so much like *pictus* that I might consider it a subspecies if it were geographically isolated, but the occurrence of a form of *pictus* (*pictoides*) at Nadzab and Lae makes this treatment impossible. The 3-striate elytron distinguishes most specimens of *trinervis* from most specimens of all subspecies of *pictus,* and *trinervis* is also, on comparison, seen to be a slightly larger, slightly broader species with relatively slightly smaller head. And, as compared with *pictoides* (the subspecies of *pictus* with which *trinervis* occurs), *trinervis* is distinctly paler. I think the two species probably occur in different habitats (*i.e.*, beside different kinds of running streams), but I did not distinguish them in the field and cannot say just what the habitats are.

Tachys divisus n. sp.

Description. With characters of *politus* group as here described. Form about average for group; head and prothorax red,

elytra black, appendages testaceous; rather shining, microsculpture faint, isodiametric on front, slightly transverse and tending to form circular patterns on each side on pronotum, apparently composed of very fine transverse lines on elytra, making latter slightly iridescent. *Head* .73 and .73 width prothorax; eyes moderately large and prominent, genae forming *c.* right angles with neck; antennae rather slender, median segments at least 2X long as wide, segment 3 longer than segment 2; frontal foveae short, moderately impressed. *Prothorax* subcordate; width/length 1.45 and 1.45; base/apex 1.21 and 1.20; base/head 1.07 and 1.06; sides broadly rounded through much of length, rather broadly sinuate before base; apex subtruncate or slightly emarginate, with anterior angles not otherwise advanced; base subtruncate, slightly sinuate towards sides; posterior angles *c.* right, briefly carinate; disc moderately convex, with usual impressions; basal sulcus moderately deep, at most finely crenate, interrupted at middle and with a distinct fovea. *Elytra* of about average width and convexity; width of elytra/prothorax 1.59 and 1.51; margins broadly rounded at humeri; each elytron with 2 dorsal striae well impressed at least in part; stria 8 entire, not much bowed away from margins; each elytron with 2 dorsal punctures slightly more than ¼ and ½ from base, on position of 3rd stria. *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* normal; ♂ unknown; ♀ last ventral with traces of pubescence just visible at 54X. *Measurements:* length 2.8-2.9; width 1.2-1.3 mm.

Types. Holotype ♀ (M.C.Z. No. 30,202) and 2 (♀ ♀) paratypes all from Chimbu Valley, Bismarck Range, **N-E. N. G.**, 5000-7500 ft., Oct. 1944 (Darlington).

Measured specimens. The holotype and 1 paratype.

Notes. This is probably a member of the *pictus* subgroup, but it is immediately distinguished from all forms of *pictus* by coloration. Whether it is really a distinct species remains to be discovered.

Tachys par n. sp.

Description. With characters of *politus* group as here defined. Moderately stout and convex; piceous, not spotted, legs testaceous, antennae and mouthparts more brownish; moderately shining, meshes of microsculpture clearly visible (at 54X) only on clypeus and adjacent part of front, but probably formed of very fine transverse lines on pronotum and elytra, which are

somewhat iridescent. *Head* .74 width prothorax; eyes rather large and prominent (in group), genae forming *c.* right angles with neck; antennae with median segments about 2X long as wide (or slightly shorter), segment 3 very slightly longer than 2; frontal sulci short, moderately impressed, doubled; mentum not foveate. *Prothorax* transversely subcordate; width/length 1.48; base/apex 1.15; base/head 1.03; sides rounded anteriorly, almost straight and converging and slightly and broadly sinuate toward base; apex subtruncate with anterior angles not advanced; base subtruncate, slightly sinuate and slightly oblique at sides; posterior angles well defined but somewhat obtuse, scarcely carinate; disc rather strongly convex, with anterior transverse impression nearly obsolete, median line fine; basal sulcus rather lightly impressed, interrupted and with a small fovea at middle. *Elytra* about ⅓ wider than prothorax (E/P *c.* 1.36); margins rounded at humeri; each elytron with 2 dorsal striae impressed at least in part (2nd much abbreviated at both ends), but other dorsal striae not indicated; stria 8 entire, well impressed, somewhat bowed away from margin before middle; 2 dorsal punctures on or inside of position of 3rd stria rather close together, at about basal ⅓ and just behind middle of elytral length. *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* (♂) normal; 2 segments each front tarsus ♂ slightly dilated. *Measurements:* length 2.1; width 0.95 mm.

Type. Holotype ♂ (M.C.Z. No. 30,203) from Maffin Bay, **Neth. N. G.**, Aug. 1944 (Darlington); unique.

Measured specimen. The type.

Notes. Characters given in the key will distinguish this species from any other in New Guinea. I do not know its exact relationships or habits.

Tachys psilus Andrewes

Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, pp. 403, 429.

Description (recognition characters only). A rather large, stout *Tachys* of the *politus* group, with sides of prothorax very strongly sinuate well before base, front with distinct isodiametric microsculpture at least anteriorly, color dark reddish piceous with elytra 4-maculate with pale, and only the sutural stria well impressed on each elytron although additional striae are indicated. Proportions: head .69 and .67 width prothorax: prothoracic width/length 1.44 and 1.46, base/apex 1.35 and 1.40, base/head 1.12 and 1.19; width elytra/ prothorax 1.42 and 1.47.

Measurements: length 2.9-3.2; width 1.25-1.4 mm. (Andrewes gives length as 2.75 mm.).

Types. Described from 3 examples from Rigo, southern **Papua** (L. Loria, Genoa Civic Mus.). The actual type, designated by Andrewes, is in the Genoa Civic Mus. A "cotype" is in the British Mus. where I examined it in 1947.

Occurrence in New Guinea. **Papua**: 16, Dobodura, Mar.-July 1944 (Darlington); 2, Oro Bay, Dec. 1943-Jan. 1944 (Darlington); 19, Milne Bay, Dec. 1943 (Darlington). **N-E. N. G.**: 13, Nadzab, July 1944 (Darlington); 14, Lae, Oct. 1944 (Darlington), and 1, same locality, sea level, July 24, 1955 (J. L. Gressitt, Bishop Mus.) taken in light trap.

Measured specimens. A pair (♂ ♀) from Dobodura.

Notes. This species is adequately defined above and in the key to species of the *politus* group. I believe it occurs in debris by running water. I have a series of it also from Cape Gloucester, **New Britain**, Jan.-Feb. 1944 (Darlington).

Tachys psiloides n. sp.

Description. With characters of *politus* groups as here defined. Rather stout and convex; irregular dark reddish or piceous, each elytron with post-humeral and subapical testaceous spots, appendages testaceous; shining, almost without dorsal microsculpture, but isodiametric meshes sometimes faintly visible on front. *Head* .69 and .68 width prothorax; eyes a little smaller and less prominent than usual in group, genae forming slightly obtuse angles with sides of neck; antennae with middle segments about 2X long as wide, segment 3 slightly longer than 2; front more or less impressed between eyes, and/or clypeus and adjacent part of front slightly swollen; frontal sulci short, well impressed, partly doubled. *Prothorax* subcordate; width/length 1.41 and 1.37; base/apex 1.36 and 1.35; base/head 1.16 and 1.21; sides rather strongly arcuate for ¾ or more of length, then strongly sinuate well before base and subparallel or slightly diverging to basal angles; apex subtruncate or slightly emarginate with anterior angles not otherwise advanced; base subtruncate; posterior angles on the acute side of right, with long carinae; basal transverse sulcus well impressed, not crenate, interrupted and with a conspicuous fovea at middle. *Elytra* wide and convex; width elytra/prothorax 1.49 and 1.53; margins rounded or faintly angulate at humeri; each elytron with 1 (sutural) discal stria impressed, additional striae less impressed or faintly

indicated; stria 8 entire, well impressed, slightly bowed away from margin before middle; 2 dorsal punctures on or inside (position of) 3rd stria behind ¼ and ½ elytral length. *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* normal: 2 segments each front tarsus ♂ very slightly dilated; last ventral segment without visible pubescence at 54X. *Measurements:* length 2.5-2.8; width 1.1-1.25 mm.

Types. Holotype ♂ (M.C.Z. No. 30,204) and 10 paratypes from Dobodura, **Papua**, Mar.-July 1944 (Darlington), and additional paratypes as follows. **Papua**: 8, Milne Bay, Dec. 1943 (Darlington). **N-E. N. G.**: 2, Erima, 1896 (Biró, Hungarian National Mus.). **Neth. N. G.**: 6, Hollandia, July-Sept. 1944 (Darlington); 1, Maffin Bay, Aug. 1944 (Darlington).

Measured specimens. The ♂ holotype and 1 ♀ paratype from Dobodura.

Notes. This is probably related to the preceding species. It occurs at several of the same localities. It differs in being smaller, with front more impressed between eyes (or with clypeus more swollen), and with little or no distinct microsculpture on even anterior part of front. The present species and the preceding one (*psilus*) both occur at Cape Gloucester, **New Britain**. Whether the two differ in habits I do not know, for I did not distinguish them in the field.

Tachys milneanus n. sp.

Description. With characters of *politus* group as here defined. Form about average for group; nearly uniform rufous, elytra not spotted but with marginal gutters paler, legs testaceous, antennae slightly browner; microsculpture faint on head, not distinguishable on discs of pronotum and elytra but latter faintly iridescent. *Head* .71 width prothorax; eyes moderately large and prominent, genae forming *c.* right angles with neck; antennae with median segments about 2X long as wide, segment 3 slightly longer than segment 2; frontal impressions short, moderately impressed, diverging posteriorly, partly doubled. *Prothorax* transversely subcordate; width/length 1.45; base/apex 1.17; base/head 1.07; sides broadly rounded anteriorly, almost straight and converging posteriorly, scarcely sinuate before base; apex subtruncate or broadly emarginate with angles not otherwise advanced; base truncate at middle, slightly sinuate and slightly oblique at sides; basal angles obtuse but well defined, costate; disc moderately convex, with anterior transverse impression

almost obsolete, middle line fine; basal sulcus moderately impressed, finely crenate, almost interrupted at middle and with a median fovea. *Elytra* of about average width and convexity for group; width elytra/prothorax 1.40; margins rounded at humeri; sutural stria impressed and almost entire, additional discal striae faint; stria 8 entire but rather fine before middle, not much bowed away from margin; apical striole normal for group; each elytron with 2 dorsal punctures on or inside of position of 3rd stria behind ¼ and ½ of elytral length. *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* (♂) normal: each front tarsus ♂ with 2 segments at most very slightly dilated; no visible pubescence on ♂ last ventral segment. *Measurements:* length 2.2; width 0.95 mm.

Type. Holotype ♂ (M.C.Z. No. 30,205) from Milne Bay, Papua, Dec. 1943 (Darlington); unique.

Measured specimen. The type.

Notes. Except that each elytron is 1- (instead of 2-) striate, this species somewhat resembles *par*, because of the general form and uniform coloration, but I am not sure there is actually a relationship. The form of stria 8, shallower and less bowed away from the margin in this species than in *par*, suggests that it is not related.

Tachys parapictus n. sp.

Description. With characters of *politus* group as here defined. Form rather broad but not very convex (in group); reddish piceous, elytra 4-plagiate (each elytron with large posthumeral and large subapical testaceous blotches), legs testaceous, antennae slightly browner; moderately shining, microsculpture faint on front (isodiametric or slightly transverse) and disc of pronotum (more transverse and tending to form circular patterns on each side of pronotum), scarcely visible at 54X on elytra but probably present as very fine transverse lines which make elytra slightly iridescent. *Head* .69 and .70 width prothorax; eyes moderately large and prominent, genae forming *c.* right angles with neck; antennae with middle segments about 2X long as wide, segment 3 scarcely longer than 2; frontal grooves rather short, well impressed, parallel, vaguely doubled. *Prothorax* transversely subcordate; width/length 1.50 and 1.47; base/apex 1.19 and 1.18. base/head 1.10 and 1.09; sides broadly rounded anteriorly, nearly straight and converging posteriorly, then slightly or moderately sinuate before base; apex slightly

emarginate but anterior angles not otherwise advanced; base truncate at middle, sinuate at sides; lateral margins slightly broader than usual; posterior angles well defined, right or slightly obtuse, carinate; disc moderately convex, with usual faint anterior transverse impression and fine middle line; basal sulcus well impressed, at most faintly crenate, interrupted and with a fovea at middle. *Elytra* rather wide, moderately convex; width elytra/prothorax 1.49 and 1.47; margins rounded at humeri; sutural stria impressed for most of length, additional dorsal striae at most faintly indicated; stria 8 entire but fine at middle, not bowed away from margin; apical striole normal for group; 2 dorsal punctures about on position of 3rd stria a little less than ⅓ and ⅔ from base. *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* normal; ♂ with two basal segments each front tarsus scarcely or not dilated; last ventral segments without visible pubescence in both sexes. *Measurements:* length 2.1-2.6; width 0.9-1.1 mm.

Types. Holotype ♂ (M.C.Z. No. 30,206) and 22 paratypes from Hollandia, **Neth. N. G.**, July-Sept. 1944 (Darlington), and additional paratypes as follows: **N-E. N. G.**: 1, Nadzab, July 1944 (Darlington); 18, Erima, Astrolabe Bay, 1896 (Biró, Hungarian National Mus.); 2, Stephansort, Astrolabe Bay, 1898 (Biró, Hungarian Mus.).

Measured specimens. The ♂ holotype and 1 ♀ paratype from Hollandia.

Notes. This species resembles and is probably related to *pictus* (described in preceding pages) but has 1-striate rather than 2-striate elytra and differs slightly in other ways. Both species occur in the vicinity of Huon Gulf (at Nadzab) and Astrolabe Bay. Both probably occur by running water, but I did not distinguish them in the field and cannot give their exact habitats.

Tachys subfumatus n. sp.

Description. With characters of *politus* group as here defined. Form about average for group, rather strongly convex; dark reddish or piceous, elytra 4-maculate (each elytron with moderate post-humeral and subapical testaceous blotches), appendages testaceous or brownish-testaceous; shining, almost without visible dorsal microsculpture. *Head* .68 and .67 width prothorax; eyes moderately large and prominent, genae forming right or slightly obtuse angles with neck; antennae with median segments about

1½X (less than 2X) long as wide, segment 3 longer than segment 2; front slightly impressed between eyes (or clypeus swollen), frontal foveae very short but deep. *Prothorax* transversely subcordate; width/length 1.46 and 1.46; base/apex 1.20 and 1.28; base/head 1.16 and 1.16; sides broadly arcuate in much of length, moderately sinuate before base; apex truncate with angles not advanced; base truncate, slightly oblique toward sides; lateral margins slightly wider than usual; posterior angles well defined, *c.* right, carinate, disc rather strongly convex, with anterior transverse impression almost obsolete, middle line fine; basal sulcus well impressed, rather finely crenate, interrupted and with fovea at middle. *Elytra* rather broad and strongly convex; width elytra/prothorax 1.41 and 1.39; margins rounded or at most faintly angulate at humeri; each elytron with sutural stria nearly entire and well impressed but not impressed on *basal* declivity; other dorsal striae faint or absent; stria 8 entire, deep, bowed away from margin before middle; 2 dorsal punctures on or inside position of 3rd stria slightly behind basal ¼ and middle of elytral length. *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* normal: ♂ with 2 segments each front tarsus at most slightly dilated; last ventral segment without visible pubescence in either sex (at 54X). *Measurements:* length 2.2-2.5; width *c.* 1.0-1.1 mm.

Types. Holotype ♂ (M.C.Z. No. 30,207) and 32 paratypes from Dobodura, **Papua**, Mar.-July 1944 (Darlington), and additional paratypes from **Papua** as follows: 2, Oro Bay, Dec. 1943-Jan. 1944 (Darlington); and 1, Milne Bay, Dec. 1944 (Darlington).

Measured specimens. The ♂ holotype and 1 ♀ paratype from Dobodura.

Notes. Sufficiently distinguished from other species that occur in New Guinea in the key to species of the *politus* group. Occasional specimens of this species, including the one from Erima listed above, have the second discal stria impressed on the elytron, but these specimens should key out on characters given in parentheses in the first part of couplet 13.

Tachys fumatus n. sp.

?deliciolus Sloane 1921, Proc. Linn. Soc. New South Wales **46**, p. 202 (not *deliciolus* Bates).

Description. With characters of *politus* group as here defined. Form about average for group but rather strongly convex; dark

reddish piceous, elytra 4-maculate (each elytron with a rather small post-humeral and slightly larger subapical testaceous spot), appendages testaceous; reticulate microsculpture not distinguishable dorsally but probably present at least on elytra as very fine transverse lines, for elytra slightly irideseent. *Head* .73 and .72 width prothorax; eyes rather large and prominent, genae forming *c.* right angles with neek; antennae with middle segments about 2X (or slightly less) long as wide, segment 3 slightly longer than 2; front impressed between eyes (or elypeus swollen); frontal sulei linear, well impressed, slightly diverging posteriorly, doubled, but not extending onto clypeus. *Prothorax* subeordate; width/length 1.47 and 1.45; base/apex 1.14 and 1.18; base/head 1.00 and 1.02; sides strongly rounded anteriorly, moderately and rather broadly sinuate before base; lateral margins rather wide (in group); apex subtruneate or broadly emarginate but angles not otherwise advanced; base subtruneate; posterior angles well defined, right or slightly obtuse, earinate; dise rather strongly eonvex, with anterior transverse impression almost obsolete, middle line very fine; basal sulcus impressed and finely erenate at sides, rather broadly interrupted at middle and with a somewhat variable fovea at middle. *Elytra* rather short, broad, and very eonvex; width elytra/prothorax 1.36 and 1.38; margins rounded or obtusely angulate at humeri; sutural stria entire, reaching extreme base; additional dorsal striae much lighter or faint or absent; stria 8 entire, deep, bowed away from margin before middle; 2 dorsal punctures on each elytron on or inside position of 3rd stria not much behind basal ¼ and middle of elytral length. *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* normal: ♂ with 1st two segments each front tarsus moderately dilated, wider than usual in group; no distinct pubescence on last segment in either sex. *Measurements:* length 2.1-2.7; width 0.9-1.15 mm.

Types. Holotype ♂ (M.C.Z. No. 30,208) and 9 paratypes from Dobodura, **Papua**, Mar.- July 1944 (Darlington), and additional paratypes as follows. **Papua**: 4, Oro Bay, Dec. 1943-Jan. 1944 (Darlington). **N-E. N. G.**: 9, Lae, Oct. 1944 (Darlington); 6, Seleo, 1896 (Biró, Hungarian National Mus.); 1, Madang ("Friedrich-Wilh.-hafen"), 1900 (Biró, Hungarian National Mus.). **Neth. N. G.**: 7, Hollandia, July-Sept. 1944 (Darlington); 10, Maffin Bay, Aug. 1944 (Darlington), and 1, same locality, Sept. 1944 (E. S. Ross, California Acad.).

Measured specimens. The ♂ holotype and 1 ♀ paratype from Dobodura.

Notes. This species is deceptively similar to *fumicatus* (p. 469) but is instantly distinguished by the much shorter frontal foveae. It probably occurs in wet places, but I did not distinguish it from *fumicatus* in the field and cannot give its exact habitat. It may (or may not) be the species casually mentioned from New Guinea by Sloane (*loc. cit.*) as *deliciolus* Bates (= *poecilopterus* Bates). It is apparently not closely related to any Australian species.

Tachys submutatus n. sp.

Description. With characters of *politus* group as here defined. Form about average for group except elytra a little more narrowed posteriorly, rather strongly convex; black or nearly so, elytra bimaculate (each elytron with a rather small clear spot near top of posterior declivity), appendages testaceous; shining, dorsal microsculpture not distinguishable. *Head* .74 and .71 width prothorax; eyes moderately large and prominent, genae forming right or slightly obtuse angles with neck; antennae with middle segments 2X or more longer than wide, segment 3 slightly longer than 2; front impressed between eyes; frontal sulci rather short, sharply impressed, slightly diverging posteriorly, doubled. *Prothorax* subcordate; width/length 1.24 and 1.27; base/apex 1.25 and 1.25; base/head 1.03 and 1.08; sides broadly rounded anteriorly, oblique and converging posteriorly, slightly sinuate before base; apex truncate with angles not advanced; base subtruncate at middle, slightly oblique at sides; posterior angles distinct but slightly blunted, obtuse; disc strongly convex with anterior transverse impression obsolete, middle line fine; basal sulcus moderately impressed, entire, crenate, but without obviously differentiated median fovea. *Elytra* more than ⅓ wider than prothorax (E/P 1.38 and 1.35), widest not far behind humeri, slightly tapering posteriorly; margins broadly rounded but slightly obtusely angulate at humeri; each elytron with sutural stria impressed posteriorly (but obsolete or nearly so before middle) and with parts of three additional discal striae well impressed but abbreviated anteriorly and posteriorly, the striae apparently being numbers 4, 5, and 6 (striae 2 and 3 apparently obsolete); stria 8 entire, very deep, bowed away from margin before middle; 2 dorsal punctures on each elytron in smooth space betwen sutural and

presumed 4th striae about ⅓ from base and just behind middle of elytral length. *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* normal for group: ♂ with 2 segments each front tarsus scarcely dilated; last ventral segment without visible pubescence in both sexes. *Measurements:* length 2.6-3.0; width 1.0-1.2 mm.

Types. Holotype ♂ (M.C.Z. No. 30,209) and 4 paratypes from Nadzab, **N-E. N. G.**, July 1944 (Darlington); 1 paratype, Chimbu Valley, Bismarck Range, **N-E. N. G.**, 5000-7500 ft., Oct. 1944 (Darlington); and 1 paratype, Dobodura, **Papua**, Mar.-July 1944 (Darlington).

Measured specimens. The ♂ holotype and the (♀) paratype from Dobodura.

Notes. This is an outstandingly distinct species because of the irregularly spaced elytral striae. It is related only to the following one, so far as I know.

Tachys mutatus n. sp.

Description. With characters of *politus* group as here defined. Form about average for group, but very convex; black or reddish black, elytra bimaculate (each elytron with a testaceous spot near top of declivity), appendages testaceous; shining, without detectable dorsal microsculpture. *Head* .72 and .70 width prothorax; eyes not quite so large as in preceding species, genae forming slightly obtuse angles wih neck; mandibles a little longer and less curved than usual in group; antennae with middle segments about 2X long as wide; front scarcely impressed across middle, with foveae rather well impressed, sublinear, slightly diverging posteriorly, not distinctly doubled. *Prothorax* subcordate; width/length 1.27 and 1.28; base/apex 1.27 and 1.27; base/head 1.07 and 1.09; sides rather broadly rounded through much of length, moderately sinuate before base; apex truncate with angles not advanced; base subtruncate, slightly oblique at sides; posterior angles almost right (slightly obtuse), carinate, disc very convex, with anterior transverse impression and middle line almost obsolete; basal sulcus entire, well impressed, crenate, but not interrupted at middle and without differentiated median fovea. *Elytra* more than ⅓ wider than prothorax (E/P 1.40 and 1.36), a little less tapering than in preceding species; margins slightly (obtusely) angulate at humeri; each elytron with sutural stria impressed posteriorly,

obsolete in about anterior ⅓, and part of 1 additional *outer* dorsal stria (probably the 5th) well impressed except abbreviated anteriorly and much more so posteriorly; stria 8 entire, very deep, bowed away from margin before middle; 2 dorsal punctures in smooth area near or inside of position of (obsolete) 3rd stria behind basal ¼ and middle of elytral length. *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* normal: ♂ with first 2 segments each front tarsus slightly if at all dilated; last ventral segment without distinguishable pubescence in both sexes. *Measurements:* length 2.5-2.8; width 1.0-1.15 mm.

Types. Holotype ♂ (M.C.Z. No. 30,210) from Dobodura, **Papua**, Mar.-July 1944 (Darlington), and additional paratypes as follows: **Papua**: 1, Milne Bay, Dec. 1943 (Darlington). **N-E. N. G.**: 2, Nadzab, July 1944 (Darlington); 1, Chimbu Valley, Bismarck Range, 5000-7500 ft., Oct. 1944 (Darlington); 3, Sattelberg, 1899 (Biró, Hungarian National Mus.).

Measured specimens. The ♂ holotype from Dobodura and 1 ♀ paratype from Nadzab.

Notes. This is another very distinct species, comparable only with the preceding one, from which it differs in further reduction of the elytral striation, slightly less tapering elytra, etc.

Tachys borneensis Andrewes

Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, pp. 401, 418.

Description (for recognition only). A moderately broad, rather depressed member of *politus* group; each elytron with 4 discal (incl. sutural) striae well impressed at least in part; 5th stria sometimes impressed, but if so, much shorter than 4th; color dark brown, not spotted, legs testaceous, palpi and most of antennal segments brown; microsculpture distinct and isodiametric on front, fainter and more transverse and tending to form circular patterns on each side on pronotum, very fine and transverse on elytra. Proportions of specimen from New Guinea: head .73 width prothorax; prothoracic width/length 1.46, base/apex 1.24, base/head 1.16; width elytra/prothorax 1.41. *Measurements:* length *c.* 3.1; width *c.* 1.2 mm.

Types. The type is from Borneo in the Andrewes collection, British Mus. Additional "cotypes" were from Borneo and New Guinea, the latter from Dilo on the south coast of **Papua** (Loria, Genoa Civic Mus. and British Mus.).

Occurrence in New Guinea. Known from New Guinea only by the Dilo specimens collected by Loria and by 1 specimen from Kiunga, Fly R., **Papua**, July 11-14, 1957 (W. W. Brandt, Bishop Mus.).

Measured specimen. A ♀ from Dilo in the British Mus.

Notes. The 4 regularly spaced, impressed striae on each elytron, with the 5th stria absent or relatively short, distinguish this species from all others of the group known in New Guinea.

Tachys aeneus Putzeys

Putzeys 1875, Ann. Mus. Civ. Genova (Genoa) **7**, p. 744.
Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, pp. 401, 417.
biplagiatus Jordan (not Dejean) 1894, Novitates Zoologicae **1**, p. 112.
jordani Csiki 1928, Coleop. Cat., Carabidae, Harpalinae **1**, p. 167.

Description (for recognition only). A moderately stout and convex, rather dull member of *politus* group, with 5 sharply impressed but (excepting the sutural) abbreviated striae on each elytron. Proportions: head .66 and .66 width prothorax; prothoracic width/length 1.47 and 1.47, base/apex 1.29 and 1.32, base/head 1.28 and 1.29; width elytra/prothorax 1.32 and 1.32. *Measurements:* length 2.6-3.1; width 1.1-1.3 mm.

Types. Of *aeneus*, from "Macassar" (Celebes), in Genoa Civic Mus. (seen by Andrewes); of *biplagiatus*, from "Tenimber," in Oberthür collection, now at Paris Mus. (also seen by Andrewes); of *jordani*, as for *biplagiatus* (the name *jordani* replaces *biplagiatus* Jordan, which is preoccupied).

Occurrence in New Guinea. **Papua**: 16, Dobodura, Mar.-July 1944 (Darlington). **N-E. N. G.**: 5, Nadzab, July 1944 (Darlington); 1, Ebabaang, Mongi Watershed, Huon Peninsula, 1300-1400 m. (*c.* 4225-4500 ft.), Apr. 16-18, 1955 (E. O. Wilson, M.C.Z.); 1, Chimbu Valley, Bismarck Range, 5000-7500 ft., Oct. 1944 (Darlington); 94, Sattelberg, Huon Peninsula, 1899 (Biró, Hungarian National Mus.); 1, Stephansort, Astrolabe Bay, 1898 (Biró, Hungarian National Mus.). **Neth. N. G.**: 43, Hollandia, July-Sept. 1944 (Darlington); 5, same locality, Apr. and May 1945 (Malkin, U.S.N.M.); 1, Maffin Bay, Aug. 1944 (Darlington); 5, Biak Is., Oct. 1944 (Darlington); 1, Sansapor, Aug. 1944 (Darlington).

Measured specimens. A pair (♂ ♀) from Dobodura.

Notes. This easily recognized species is very common in an unusual habitat for *Tachys*, on *dry* ground in more or less open places, under debris etc. All the numerous specimens before

me from Papua and N-E. N. G. are bimaculate, and so are most of those from Neth. N. G., but 2 specimens in the Hollandia series and 1 from Biak Is. and the 1 from Maffin Bay lack elytral spots. Outside of New Guinea, the species is known from Morotai Is. in the **Moluccas** (Darlington, M.C.Z.), **Celebes**, **Tanimbar**, **Wetar**, and **Sumbawa**.

Tachys nitens Andrewes

Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, pp. 401, 412.

Description (for recognition only). A stout, compact, very convex member of the *politus* group; black, elytra bimaculate (a clear spot near top of declivity of each elytron); 5 dorsal striae sharply impressed on each elytron (but all except sutural abbreviated anteriorly and posteriorly). Proportions: head .69 and .67 width prothorax; prothoracic width/length 1.44 and 1.48; base/apex 1.35 and 1.28; base/head 1.15 and 1.18; width elytra/prothorax 1.33 and 1.33. *Measurements:* length 2.6-2.7; width 1.15-1.25 mm. (Andrewes gives length as 2.75 mm.).

Type. A ♂ from Dilo, south coast of **Papua** (Loria, Genoa Civic Mus.).

Occurrence in New Guinea. The type is the only specimen known from **Papua**. From **N-E. N. G.** I have seen 1, Nadzab, July 1944 (Darlington), and 1, Lae, Oct. 1944 (Darlington); and from **Neth. N. G.** 1, Hollandia, Nov. 1944 (H. Hoogstraal, M.C.Z.).

Measured specimens. A pair, ♂ ♀, from Hollandia and Lae, respectively.

Notes. Although I have not seen the type of this species, it is easily recognizable from description.

Tachys bembidiformis Jordan

Jordan 1894, Novitates Zoologicae **1**, p. 111.
Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, pp. 401, 412.
Louwerens 1953, Verhandlungen, Naturforschenden Gesellschaft Basel **64**, p. 305.
helmsi Sloane 1898, Proc. Linn. Soc. New South Wales **23**, p. 476.
—— 1921, Proc. Linn. Soc. New South Wales **46**, pp. 198, 202.

Description (for recognition only). A rather broad, strongly convex, "compact" member of the *politus* group (but with prothorax rather narrow); strongly shining, black or reddish piceous with small subapical elytral spots and appendages testaceous; each elytron with 6 strongly impressed but incomplete

striae. Proportions: head .72 and .74 width prothorax; prothoracie width/length 1.18 and 1.19, base/apex 1.16 and 1.16, base head 1.00 and .97; width elytra/prothorax 1.51 and 1.48. *Measurements:* length 2.8-3.1; width 1.2-1.3 mm.

Types. Of *bembidiiformis*, from "Tenimber," in Oberthür collection, now at Paris Mus.; of *helmsi*, from Upper Ord R., Western Australia, in the Lea collection, now in South Australian Mus. at Adelaide.

Occurrence in New Guinea. Known only from southern **Papua**: 3, Port Moresby, Oct. 1944 (Darlington).

Measured specimens. Two ♀ ♀ from Port Moresby.

Notes. This is another easily recognized species. It is known to occur in **Java**, **Andonare Is.**, **Sumba**, **Tanimbar**, the **Philippines**, Morotai Is. in the **Moluccas** (1 specimen, Sept. 1944, Darlington), and across northern **Australia** including Cape York, as well as in **New Guinea**. It apparently inhabits wet places in more or less open country.

Tachys senarius n. sp.

Description. With characters of *politus* group as here defined. Form about average for group but less convex than usual; testaceous, sutural area etc. darker posteriorly; moderately shining, microsculpture distinct on front especially anteriorly (almost isodiametric), on pronotum (isodiametric or slightly transverse), and elytra (finer and more transverse). *Head* .73 and .71 width prothorax; eyes rather large and prominent, genae forming *c.* right angles with neck; antennae with middle segments about 2X (or slightly more) long as wide, segment 3 scarcely longer than segment 2; frontal grooves rather long, moderately impressed, subparallel. *Prothorax* transverse, width/length 1.43 and 1.46; base/apex 1.23 and 1.20; base/head 1.10 and 1.09; sides broadly rounded anteriorly, converging posteriorly, very briefly sinuate before base; apex subtruncate or very broadly emarginate with angles not otherwise advanced; base subtruncate, slightly sinuate toward sides; posterior angles obtuse or minutely right, with long carinae; lateral margins slightly wider than usual; disc only moderately convex, with anterior transverse impression almost obsolete, middle line fine, basal sulcus moderately impressed, finely crenate, interrupted and with a fovea at middle. *Elytra* of about average width, more than ⅓ wider than prothorax (E/P 1.40 and 1.37), not strongly convex, widest not far behind humeri, then slightly tapering

posteriorly; margins rounded or faintly subangulate at humeri; each elytron with 6 faintly irregular or subpunctulate dorsal striae impressed at least in part, but all except sutural abbreviated anteriorly as well as posteriorly; stria 8 entire, deep, somewhat bowed away from margin before middle; apical striole normal for group; 2 dorsal punctures inside 3rd stria before ⅓ and ⅔ of elytral length. *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* normal: ♂ with first two segments each front tarsus at most slightly dilated; ♀ with a little very short, sparse, inconspicuous pubescence barely visible at 54X on last ventral segment. *Measurements:* length 2.7-2.9; width 1.05-1.1 mm.

Types. Holotype ♂ (M.C.Z. No. 30,211) and 3 paratypes all from Nadzab, **N-E. N. G.**, July 1944 (Darlington).

Measured specimens. The ♂ holotype and 1 ♀ paratype.

Notes. Although it is very distinct, this species forms a sort of transition between *bornecnsis* (and perhaps *reticulatus* etc.) on one hand and *aeneus, papuae*, etc. on the other, but I am not sure this indicates a real relationship.

Tachys papuae Andrewes

Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, pp. 402, 421.

Description (for recognition only). A rather elongate, probably subfusiform member of the *politus* group, similar to *erotyloides* and *fusiformis* but with basal sulcus of pronotum not only impressed (shallowly) and crenulate but also interrupted and with a fovea at middle. It is (like the other species just named) dark aeneous with legs and small subapical elytral spots pale and antennae pale at base and fuscous externally. *Measurements* (*t.* Andrewes): length 3.0 mm.; width not given.

Types. "Type" from Fly R., (southern **Papua**) (L. M. D'Albertis, Genoa Civic Mus.); a "cotype" from Dilo, south coast of **Papua**, (Loria, British Mus.).

Occurrence in New Guinea. Known only from the types. I saw the cotype in 1957, but have seen no other specimens of the species.

Measured specimens. None.

Notes. See key, and comparative remarks under preceding species.

Tachys erotyloides Andrewes

Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, pp. 402, 419.

Description (for recognition only). A rather slender, subfusiform, 2-maculate, 6-striate member of the *politus* group, with prothorax rather narrow basally (compared with the following species) and with basal sulcus scarcely impressed, without median fovea, but indicated by a row of small punctures which may or may not be widely interrupted at middle. Proportions: head .65 and .63 width prothorax; prothoracic width/length 1.27 and 1.30, base/apex 1.31 and 1.34, base/head 1.25 and 1.33; width elytra/prothorax 1.27 and 1.20. *Measurements:* length 3.3-3.8; width 1.15-1.4 mm. (Andrewes gives length as 3.0-3.4 mm.).

Types. A "type" and 5 "other examples" (presumably considered "cotypes" by Andrewes), all from Dilo, south coast of **Papua** (Loria); type in Andrewes collection, British Mus., where I have seen it; other examples in Genoa Civic Mus.

Occurrence in New Guinea. **Papua**: 3, Dobodura, Mar.-July 1944 (Darlington). **N-E. N. G.** 42, Nadzab, July 1944 (Darlington); 4, Lae, Oct. 1944 (Darlington); 5, Stephansort, Astrolabe Bay, 1898 (Biró, Hungarian National Mus.); 1, Chimbu Valley, Bismarck Range, 5000-7500 ft., Oct. 1944 (Darlington). **Neth. N. G.**: 1, Hollandia, May 1945 (Malkin, U.S.N.M.); 1, Sabron, Camp 1, 1200 ft., May 15, 1936 (Cheesman, British Mus.).

Measured specimens. A pair (♂ ♀) from Nadzab.

Notes. This species usually occurs on gravelly or sandy banks of rivers.

Tachys fusiformis Andrewes

Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, pp. 402, 420.

Description (for recognition only). Another subfusiform, 2-maculate, 6-striate *Tachys* of the *politus* group, a little more depressed, duller, with wider prothoracic base than *erotyloides*, with basal sulcus of pronotum even more obliterated. Proportions: head .65 and .63 width prothorax; prothoracic width/length 1.37 and 1.37, base/apex 1.33 and 1.34, base/head 1.35 and 1.38; elytral width/prothorax 1.37 and 1.35. *Measurements:* length 3.6-4.0; width 1.5-1.65 mm. (Andrewes gives length as 3.5 mm.).

Type. A ♀ from Dilo, south coast of **Papua** (Loria, Genoa Civic Mus.).

Occurrence in New Guinea. **N-E. N. G.**: 22, Nadzab, July 1944 (Darlington).

Measured specimens. A pair (♂ ♀) from Nadzab.

Notes. I have not seen the type; my specimens are identified from description. They were taken on the banks of the Markham R.

Tachys fumicatus Group

Tachys fumicatus and its immediate allies have the general characters of the *politus* group except that the frontal sulci, which are linear, deep, and strongly converging anteriorly, are very long, extending across the clypeus; and the labrum is deeply emarginate. If *fumicatus* and its allies were included in the *politus* group, they would be notable also for their rather short antennae; posterior angles of prothorax almost without carinae; basal sulcus of pronotum moderately impressed, slightly interrupted at middle, and with a rather small fovea at middle; elytron with usually 2 discal striae well impressed (2nd abbreviated at both ends and sometimes less impressed than 1st) and stria 8 entire, very deep, and bowed away from margin before middle. The clypeus as well as the labrum appears deeply emarginate in some individuals, but this is partly a matter of change of pigmentation rather than change of structure: the edge of the clypeus at middle tends to be depigmented, transparent, and therefore apparently emarginate except in carefully adjusted lighting.

The typical species of the group is *Tachys fumicatus* Motschulsky, which is very widely distributed, occurring across southern Asia and in Africa, north to Japan, and east and south to the Philippines and New Guinea, and *fumicatus* is considered closely allied to *haemorrhoidalis* Dejean of Europe and to *curticollis* Sloane of Australia etc. Throughout much of its range *fumicatus* is the only species of its group, but *curticollis* overlaps it geographically on New Guinea and adjacent islands, and *Tachys fumatus* (described above, p. 458), which too is widely distributed in New Guinea, may (or may not) be related in spite of its shorter frontal sulci. The occurrence together of these three superficially similar species, which differ most obviously in form of frontal sulci (they differ slightly in other ways too), might be the result of a triple invasion of New Guinea. If so, *fumatus*, with deep but still short frontal sulci, presumably reached New Guinea first and may represent the

ancestral stock. The latter, in southern Asia, may then have evolved longer frontal sulci and emarginate labrum and reinvaded New Guinea, first as *curticollis*, which may be an intermediate-ancestral type, and then as *fumicatus*. Or a still broader pattern of evolution and dispersal may be indicated. *Tachys haemorrhoidalis* of Europe and *curticollis* of Australia etc. are so similar that Sloane considered them forms of one species. They may represent a stock which formerly extended from Europe to Australia but has interrupted its own continuity of distribution by evolving as *fumicatus* in southern Asia. If this has happened, it is an example of "centrifugal speciation" (W. L. Brown 1957, *Quarterly Review Biol.* **32**, pp. 247-277). It is also possible that the three species *fumatus*, *curticollis*, and *fumicatus* differentiated on New Guinea, but the wide distribution of all three species on the island, and the whole broad pattern of their distribution elsewhere, seem to argue against this. All these species probably live in wet places, but I did not distinguish them in the field and cannot say whether their habitats are different. The modification of the labrum etc. suggests some change of food or habits that may account for the success of the *fumicatus* stock. The distribution and ecology of the species of this group, and if possible their evolutionary history, should be fascinating subjects for investigation.

Key to Tachys of fumicatus Group of New Guinea

1. Frontal sulci extending backward as finely impressed lines to or behind level of posterior edges of eyes (p. 469) . . . . . *fumicatus*
— Frontal sulci ending posteriorly rather abruptly, between eyes (and see notes under this species) (p. 471) . . . . . *curticollis*

Tachys fumicatus Motschulsky

Motschulsky 1851, Bull. Soc. Nat. Moscou **24**, Part 2, No. 4, p. 509.
geminatus Schaum 1860, Berliner Ent. Zeits. **4**, p. 200.
putzeysi Dupuis 1913, Ann. Soc. Ent. Belgique **57**, p. 427.
fumigatus Auct.
Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, pp. 466, 468.
—— 1935, Fauna British India etc., Coleop., Carabidae **2**, p. 287, fig. 48.

Description (for recognition only). A rather small, convex *Tachys*, with characters of *politus* group except for long, linear, converging frontal sulci that extend forward across clypeus. Color piceous to reddish with elytra either 2- or 4-spotted with pale: a subapical spot always present on each elytron; posthumeral spots present or absent (see notes below). Proportions:

head .79 and .77 width prothorax; prothoracic width/length 1.37 and 1.37, base/apex 1.11 and 1.17, base/head .96 and .98; width elytra/prothorax 1.35 and 1.36. *Measurements:* length 1.9-2.3; width 0.8-0.95 mm.

Types. Of *fumicatus*, from "Ind. or," in Moscow University Mus.; of *geminatus*, from Celebes (Wallace), in Deutsche Ent. Mus.; of *putzeysi*, also from Celebes, present location of type(s) unknown.

Occurrence in New Guinea. **Papua**: 6, Milne Bay, Dec. 1943 (Darlington); 4, Port Moresby, Oct. 1944 (Darlington); 11, Dobodura, Mar.-July 1944 (Darlington); 7, Oro Bay, Dec. 1943-Jan. 1944 (Darlington). **N-E. N. G.**: 1, Nadzab, July 1944 (Darlington); 1, Stephansort, Astrolabe Bay, 1898 (Biró, Hungarian National Mus.); 2, Aitape, Aug. 1944 (Darlington). **Neth. N. G.**: 57, Hollandia, July-Sept. 1944 (Darlington); 2, same locality, May and June 1945 (Malkin, U.S.N.M.); 5, same locality, Feb. and May 1945 (Hoogstraal, Chicago Mus.); 2, Maffin Bay, Sept. 1944 (E. S. Ross, California Acad.); 1, Sansapor, Aug. 1944 (Darlington).

Measured specimens. One pair (♂ ♀) from Hollandia.

Notes. This species is easily recognized by characters given for the group and in the preceding brief specific description. It is distinguished from *curticollis* (below) as described thereunder. It is very common from **Ceylon** and **India** north to **Japan** and east and south to the **Philippines** and **New Guinea**, but not Australia. It occurs also in **Africa**.

It is usually said that typical *fumicatus* is 2-spotted and occurs mainly in southern Asia etc., and that "variety" *geminatus* is 4-spotted and occurs mainly in the Malay Archipelago, but this is an over-simplification. For one thing, *fumicatus* was originally described as 4-spotted. For another, the spotting varies individually in many localities. In New Guinea, for example, the 4 specimens of *fumicatus* from Port Moresby are essentially 2-spotted, with posthumeral spots absent or faint; the 6 from Milne Bay are intermediate, with posthumeral spots indicated but sometimes faint; 18 from Dobodura and Oro Bay, variable, 2-spotted or 4-spotted or intermediate; 4 from localities in N-E. N. G., strictly 2-spotted; 63 from Hollandia, mostly 2-spotted, but 8 specimens 4-spotted or intermediate; 2 from Maffin Bay, 2-spotted; and 1 from Sansapor, 4-spotted. It should be added that 3 specimens from Cape Gloucester, **New Britain**, are all distinctly 4-spotted, and specimens from Morotai

Is. in the **Moluccas** are usually 4-spotted, with anterior spots often very large.

A specimen of this species in the U.S.N.M. is labeled "in packing on orchids from P. I. [Philippine Islands] at Honolulu Hawaii, Apr. 13, 1932, #4227."

Tachys curticollis Sloane

Sloane 1896, Proc. Linn. Soc. New South Wales **21**, pp. 357, 363.
haemorrhoidalis var. *curticollis* Sloane 1921, Proc. Linn. Soc. New South Wales **46**, pp. 195, 198, 203.

Description. None required here. See notes below. Proportions: head .79 and .78 width prothorax; prothoracic width/-length 1.35 and 1.39, base/apex 1.14 and 1.11, base/head 1.00 and .98; width elytra/prothorax 1.40 and 1.44. *Measurements:* length 2.2-2.5; width 0.9-1.1 mm.

Types. Described from Tweed R. and Cootamundra District, New South Wales, Australia; the actual type is from the second locality, and is in the Sloane collection at Canberra.

Occurrence in New Guinea. **Papua**: 1, Dobodura, Mar.-July 1944 (Darlington); 3, Oro Bay, Dec. 1943-Jan. 1944 (Darlington). **N-E. N. G.**: 3, Nadzab, July 1944 (Darlington); 3, Lae, Oct. 1944 (Darlington); 4, Aitape, Aug. 1944 (Darlington). **Neth. N. G.**: 39, Hollandia, July-Sept. 1944 (Darlington); 10, Maffin Bay, Aug. 1944 (Darlington), and 1, same locality, Aug. 1944 (E. S. Ross, California Acad.); 5, Sansapor, Aug. 1944 (Darlington).

Measured specimens. A pair (♂ ♀) from Hollandia.

Notes. Although this species is very close to *fumicatus*, and is most easily separated by a rather slight difference in the posterior extension of the frontal sulci (longer and more finely impressed posteriorly in *fumicatus*), when the two species are sorted out on this character other differences appear that leave no doubt that the two are distinct. For example, *fumicatus* (in New Guinea) is usually 2-spotted and always has each elytron sharply 2-striate, while *curticollis* is always 4-spotted and often has the 2nd stria on each elytron less impressed than the 1st. Moreover *curticollis* (in New Guinea) tends to have the sides of the prothorax more sinuate posteriorly, has relatively slightly wider elytra, and is slightly more shining. This species occurs also in eastern **Australia**, from the tip of Cape York to southern New South Wales. I found it at Cape Gloucester, **New Britain**, where *fumicatus* occurred too, but did

not find it on Morotai Is. in the Moluccas, where *fumicatus* was common. I have discussed the possible history of this species under the *Tachys fumicatus* group. Specimens from New Guinea may be slightly different from typical *curticollis* of Australia, but I have found no satisfactory character to separate them. The species varies in trivial ways from locality to locality. For example, my 4 specimens from Dobodura and Oro Bay have the elytra sharply 2-striate, with 2nd stria about as deeply impressed as (but shorter than) 1st; 3 from Lae have 2nd stria deep, but 3 from Nadzab have it lightly impressed; of 4 from Aitape, 2 have 2nd stria deep, 2 almost obliterated (all are 4-spotted and have frontal sulci of *curticollis*); 39 from Hollandia all have 2nd stria relatively lightly impressed (a *fumicatus* from Hollandia accidently mixed with *curticollis* was picked out immediately by the sharply 2-striate elytra); of 11 from Maffin Bay, 2 have 2nd stria deep, 9 light; and 5 from Sansapor, all deep. Fourteen specimens from Cape Gloucester, New Britain, all have the 2nd stria sharply impressed (but of course abbreviated), and so do 26 from 10 localities (tip of Cape York to vicinity of Sydney) in eastern Australia. These details suggest that *curticollis* may be losing the 2nd elytral stria in the main (central) part of New Guinea (*e.g.* at Hollandia) while mixed populations occur to the east and west of the central area (at Lae-Nadzab and Maffin Bay respectively) and pure 2-striate populations occur in peripheral areas, including extreme eastern and western New Guinea, New Britain, and Australia. This may be an early stage in "centrifugal evolution" (see reference, p. 469).

Tachys acaroides Group

Noteworthy characters of this group given by Andrewes are: mentum without foveae; antennae short, submoniliform, segment 2 longer than 3; prothorax without carinae in posterior angles; elytra with margin setulose and serrate, 1 dorsal (sutural) stria impressed, stria 8 nearly obsolete, apical striole absent, and 3rd interval with 2 dorsal punctures, the posterior one not far behind middle; metasternal process hardly margined but with a groove behind it; claws not denticulate.

The species of this group resemble those of the *truncatus* group in appearance and in partial or entire obliteration of stria 8 and the apical striole, but *acaroides* etc. differ from the *truncatus* group in having the mentum without pores (but these

are sometimes absent in *truncatus*) and the posterior dorsal puncture of 3rd interval farther forward, not far behind the middle of elytral length. The single previously known species of the group is *acaroides* Motschulsky of Ceylon and now also of New Guinea (if my specimen is correctly identified), but I have a second, undescribed species from the Philippines.

Tachys acaroides Motschulsky

Motschulsky 1859, Étude Ent. **8**, p. 39.
Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, p. 469.
—— 1935, Fauna British India etc., Coleop., Carabidae **2**, p. 289 (see for additional references).

Description (for recognition only). A small (less than 2 mm.), testaceous or reddish testaceous *Tachys* which resembles some species of the *truncatus* and *haliploides* groups and must be distinguished by technical characters given in the key to species groups of *Tachys* (p. 403) and in the preceding summary of group characters. Proportions are: head .73 width prothorax; prothoracic width/length 1.44, base/apex 1.22, base/head 1.06; width elytra/prothorax *c.* 1.39. *Measurements:* length *c.* 1.8; width *c.* 0.7 mm. (Andrewes gives length as 1.5 mm.).

Types. From near Colombo, **Ceylon**. According to Andrewes (1925), Motschulsky had at least two original specimens; the actual type (*t.* Andrewes 1935) is in the Moscow University Zool. Mus.

Occurrence in New Guinea. One ♂, Dobodura, **Papua**, Mar.-July 1944 (Darlington).

Measured specimen. The ♂ from Dobodura.

Notes. This species has been known previously only from Ceylon. A supposed record for Sumatra was incorrect, based on a different, unrelated species. My New Guinean individual answers Andrewes' description reasonably well in all details except one: there is a very short vestige of the apical striole at the extreme apex of each elytron; the striole is said to be wanting in *acaroides*. For this and other minor reasons, including the distance from Ceylon, I doubt whether the specimen from New Guinea really represents *acaroides,* but I do not care to describe it from a single specimen without further information.

Tachys haliploides Group

This is a group of short, broad, very convex species defined in the key to species-groups (p. 403). Notable characters, besides the general form and appearance, are mentum without

foveae; antennae rather short, with segments 2 and 3 subequal; basal sulcus of pronotum with 2 foveae at middle; elytra with only 1 discal (sutural) stria well impressed (in species in New Guinea), stria 8 deep posteriorly but obsolete anteriorly, a rather short apical striole on middle of elytral width with a puncture on its inner side about middle of striole's length, and only 1 dorsal puncture on each 3rd interval; and tarsal claws denticulate. Some of the species of this group are very difficult to distinguish, and a careful revision of them is much needed. Those that I have collected usually occur in or under heavy vegetation on wet ground. The group occurs at least from Europe to Australia. I do not know whether it occurs in other parts of the world.

Key to Species of Tachys of haliploides Group Recorded from New Guinea

1. Slightly smaller and narrower (length 1.8–2.3 mm.), with outer segments of antennae usually more or less brownish (p. 474) . . *latissimus*
— Slightly larger and broader; antennae testaceous or nearly so (p. 476) (*haliploides*)

Tachys latissimus Motschulsky

Motschulsky 1851, Bull. Soc. Nat. Moscou **24**, Part 2, No. 4, p. 508.
Andrewes 1935, Fauna British India etc., Coleop., Carabidae **2**, p. 296.
Elaphropus gracilis Motschulsky 1862, Étude Ent. **11**, p. 36.
Andrewes 1935, Fauna British India etc., Coleop., Carabidae **2**, p. 297 (see for synonymy and additional references).
Bembidium bifoveatum Macleay 1871, Trans. Ent. Soc. New South Wales **2**, p. 117.

Description (for recognition only). This is probably the only species of the *haliploides* group that really occurs in New Guinea, and it should therefore be recognizable by group characters given above. Two color forms occur, entirely testaceous or nearly so (the typical form) and strikingly bicolored (subspecies *tinctus,* below). Proportions of the typical form: head .66 and .65 width prothorax; prothoracic width/length 1.54 and 1.57, base/apex 1.46 and 1.41, base/head 1.33 and 1.34; width elytra/prothorax 1.38 and 1.39. *Measurements* (typical form, in New Guinea): length 1.8-2.3; width 0.8-1.0 mm.

Types. Of *latissimus* and *gracilis*, from "Ind. or.", in the Moscow University Zool. Mus.; of *bifoveatum*, from Gayndah, southern Queensland, **Australia**, presumably in the Macleay Mus., Sdyney.

Occurrence in New Guinea. **Papua**: 16, Dobodura, Mar.-July 1944 (Darlington); 15, Oro Bay, Dec. 1943-Jan. 1944 (Darlington); 1, Brown R., May 24, 1956 (E. J. Ford, Jr., Bishop Mus.), taken in light trap. **N-E. N. G.**: 1, Lae, Oct. 1944 (Darlington); 4, Nadzab, July 1944 (Darlington); 1, Erima, Astrolabe Bay, 1896 (Biró, Hungarian National Mus.); 3, Aitape, Aug. 1944 (Darlington). The species is represented by another subspecies (below) in Neth. N. G.

Measured specimens. A pair (♂ ♀) from Dobodura.

Notes. According to Andrewes (1935), this species or its "variety" *gracilis* (which I see no useful reason to recognize) ranges from **India**, **Burma**, etc., to **New Guinea**, and if *Tachys bifoveatus* is a synonym, as I think it is, the range is extended to eastern **Australia** south to **Tasmania**. My Australian specimens, from localities scattered from the Cape York Peninsula to Brisbane, do not seem to be distinguishable from the series from eastern New Guinea. However, as I have said, this is a very difficult group of *Tachys*, and my conclusions about it may have to be revised. The specimens from Aitape are darker and vaguely bicolored (elytra slightly darker than head and prothorax) and therefore tend toward the following subspecies.

Tachys latissimus tinctus n. subsp.

Description. Similar to typical *Tachys latissimus* but slightly wider and different in color: head and prothorax reddish testaceous (head more or less darker posteriorly), elytra piceous or almost black with suture and marginal gutters more or less testaceous, legs testaceous, antennae with basal segments testaceous and outer segments more or less brownish. Proportions: head .65 and .67 width prothorax; prothoracic width/length 1.60 and 1.58, base/apex 1.51 and 1.48, base/head 1.42 and 1.35; width of elytra/prothorax 1.46 and 1.44. *Measurements:* length 1.8-2.1; width 0.85-1.0 mm.

Types. Holotype ♂ (M.C.Z. No. 30,212) and 57 paratypes from Hollandia, **Neth. N. G.**, July-Sept. 1944 (Darlington).

Additional material. **Neth. N. G.**: 6, Maffin Bay, Aug. 1944 (Darlington); 1, Wisselmeren: Okaitadi, 1800 m. (*c.* 5850 ft.), Aug. 7, 1955 (J. L. Gressitt, Bishop Mus.).

Measured specimens. The ♂ holotype and 1 ♀ paratype.

Notes. This bicolored subspecies of *latissimus* in central and western New Guinea has presumably evolved within the range of the typical form, which it now interrupts.

(Tachys haliploides Bates)

Bates 1892, Ann. Mus. Civ. Genova (Genoa) **32**, p. 289.

Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, pp. 337, 471, 478, pl. 3, figs. 11, 18.

—— 1935, Fauna British India etc., Coleop., Carabidae **2**, pp. 211, 291, 293, fig. 50 (see for additional references).

Description. None needed here. See preceding key to species of *haliploides* group.

Types. From **Burma**, in Genoa Civic Mus.

Occurrence in New Guinea. Doubtful; see notes, below.

Measured specimens. None.

Notes. Andrewes gives the range of this species as from **India** etc. to the **Philippines**, **Celebes**, and **New Guinea**, but the only specimens labeled from New Guinea that I have seen are from "Dorey (Wallace)" and may really be from Celebes or the Moluccas.

Tachys nanus Group

Tachys nanus and its allies form a group which is strongly characterized by the position of the apical striole (long, close to outer margin of elytron) and denticulate tarsal claws. Additional characters of the group are: mentum without foveae; antennae submoniliform; elytra with stria 8 deep posteriorly, shallow or interrupted anteriorly, and 2 dorsal punctures on 3rd or 4th interval; lower surface minutely and inconspicuously pubescent; male with first two segments each front tarsus dilated (widely or narrowly) and squamulose, female with four apical ventral setae almost in line. The group is very widely distributed, although I cannot give its exact limits. It certainly occurs across Eurasia and North America and (in the Old World) southeast across the islands to Australia etc. Most of the species are found on or under the bark of fallen trees and logs, and this probably facilitates their dispersal on drifting logs and on timber carried by man. *Tachys wallacei*, however, judging by the few specimens that I have taken, is truly arboreal, living in dense clumps of leaves and small epiphytes in the undergrowth of rain forest.

Key to Species of Tachys of nanus Group of New Guinea

1. Elytron with more than one dorsal stria well impressed (but often somewhat irregularly so); microsculpture present 2

— Elytron with only 1 dorsal stria (the sutural) well impressed, others much less impressed or absent; microsculpture absent or nearly so . . 3
2. Posterior dorsal puncture of elytron close to 4th stria; larger, more parallel sided, more depressed (p. 477) . . . . . *umbrosus*
— Posterior dorsal puncture of elytron inside 3rd stria; smaller, sides of elytra more rounded, less depressed (p. 478) . . . . . *bardus*
3. Several dorsal striae irregularly indicated (but only sutural well impressed); color brown, not conspicuously spotted (p. 479) . *wallacei*
— Elytron 1-striate; color black often (not always) conspicuously spotted with pale 4
4. Elytra 4-spotted; median impressed line of pronotum deeper at base, usually (not always) extending across basal sulcus and interrupting it (p. 480) . . . . . *acuticollis*
— Not spotted; median line of pronotum less deep posteriorly, not crossing or interrupting basal sulcus (p. 481) . . . . . *coracinus*

Tachys umbrosus Motschulsky

Motschulsky 1851, Bull. Soc. Nat. Moscou **24**, Part 2, No. 4, p. 507.
Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, pp. 485, 488, pl. 3, fig. 12, pl. 4, figs. 22, 25.
—— 1935, Fauna British India etc., Coleop., Carabidae **2**, pp. 211, 299, 300 (see for synonymy and additional references).
Van Emden 1937, Stettiner Ent. Zeits. **98**, p. 34.

Description (for recognition only). A rather large, parallel-sided, depressed, dull black species with characters of the group; elytra multistriate, with two dorsal punctures on each 4th interval near 4th stria. Proportions: head .71 and .70 width prothorax; prothoracic width/length 1.60 and 1.64, base/apex 1.18 and 1.15, base/head 1.15 and 1.15; width elytra/prothorax 1.29 and 1.26. *Measurements:* length 2.4-3.0; width 0.95-1.2 mm.

Types. Motschulsky described *umbrosus* from "Ind. or."; the actual type should probably be in the University Mus. at Moscow; Andrewes saw specimens that he thought were sent by Motschulsky to Putzeys and are now in the Brussels Mus. Of the three names cited by Andrewes (1935) as synonyms, none is based on New Guinean examples.

Occurrence in New Guinea. **Papua**: 8, Dobodura, Mar.-July 1944 (Darlington); 10, Oro Bay, Dec. 1943-Jan. 1944 (Darlington); 1, Kokoda, 1200 ft., Sept. 1933 (Cheesman); 4, Kiunga, Fly R., July 4-8, 1957 (W. W. Brandt, Bishop Mus.); 3, Normanby Is., Wakaiuna, Siwa Bay, Jan. 10, 1956 (W. W. Brandt, Bishop Mus.). **N-E. N. G.**: 1, lower Busu R., Huon Peninsula, May 1955, in lowland rain forest (E. O. Wilson,

M.C.Z.); 10, Stephansort, Huon Peninsula, 1899 (Biró, Hungarian National Mus.); 4, Sattelberg, Huon Peninsula, 1899 (Biró, Hungarian National Mus.); 2, Madang ("Friedrich-Wilh.-hafen") 1896 (Biró, Hungarian National Mus.); 1, Simbang, Huon Gulf, 1898 (Biró, Hungarian National Mus.); 1, Bulolo, 1200 m. (*c.* 3900 ft.), Aug. 25, 1956 (E. J. Ford, Jr., Bishop Mus.). **Neth. N. G.**: 5, Maffin Bay, Aug. 1944 (Darlington), and 6, same locality, Aug. and Sept. 1944 (E. S. Ross, California Acad.).

Measured specimens. A pair (♂ ♀) from Dobodura.

Notes. Widely distributed in southern **Asia** including **Ceylon** (but not Japan) and east and south to the **Philippines** and **New Guinea** and the **Solomons**. Another, similar species, *T. nanus,* occurs across temperate Europe and Asia; additional similar species are in temperate North America; and *T. brunnipennis* Macleay of northeastern Australia is similar too. *T. umbrosus* and (I suppose) its immediate allies occur on or under the bark of fallen trees and logs.

Tachys bardus n. sp.

Description. With characters of Andrewes' *nanus* group. Moderately broad and convex; reddish brown, appendages testaceous; rather shining but with visible microsculpture, nearly isodiametric on front, more transverse on pronotum, still more transverse on elytra. *Head* .68 and .67 width prothorax; eyes moderately large and prominent, genae forming *c.* right angles with neck; antennae submoniliform, with middle segments (ignoring pubescence) slightly longer than wide, and segment 2 slightly shorter than 3; frontal grooves sublinear, not deeply impressed, slightly converging anteriorly; mentum without foveae. *Prothorax* much wider than long (width/length 1.43 and 1.43); base wide (base/apex 1.42 and 1.40; base/head 1.32 and 1.32); sides moderately rounded anteriorly, nearly straight and slightly converging posteriorly, slightly sinuate before base; base and apex subtruncate; posterior angles right or slightly obtuse, well defined, minutely prominent or denticulate laterally; lateral margins rather wide (as usual in group), with sides of pronotum above margins produced backward and forming carinae a little inside posterior angles; disc with anterior transverse impression poorly defined, middle line rather deeply impressed, basal sulcus moderately impressed, subinterrupted at middle by base of impressed middle line. *Elytra* less than ½

wider than prothorax (E/P 1.43 and 1.43); margins broadly rounded at humeri, ending about opposite ends of 5th striae; all dorsal striae (1-7) present either as lightly impressed punctate striae (on disc) or lines of puncture (externally); sutural stria entire but other striae slightly abbreviated at base and more so toward apex; stria 8 impressed posteriorly but reduced to a series of punctiform impressions before middle; apical striole long, much nearer outer margin than suture, with puncture on inner edge well back; elytral intervals each with an irregular line of rather widely placed small punctures; elytron also with 2 dorsal punctures, anterior on 4th interval near base, posterior on 3rd interval before posterior ⅔ of elytral length. *Inner wings* fully developed. *Lower surface, legs,* and *secondary sexual characters* normal for group; 2 segments each front tarsus ♂ rather widely dilated. *Measurements:* length 2.2-2.5; width 0.9-1.0 mm.

Types. Holotype ♂ (M.C.Z. No. 30,213) and 3 paratypes from Dobodura, **Papua**, Mar.-July 1944 (Darlington), and 1 paratype from Oro Bay (near Dobodura), Dec. 1943-Jan. 1944 (Darlington).

Measured specimens. The ♂ holotype and 1 ♀ paratype from Dobodura.

Notes. This new species is similar to and probably closely allied to *T. malayicus* Andrewes, known from Singapore etc. and Java, but the new species has distinct microsculpture (lacking in *malayicus*) and is more uniformly colored, without the apical red blotch of *malayicus.*

Tachys wallacei Andrewes

Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, pp. 485, 490.

Description (for recognition only). A shining, castaneous, sometimes vaguely 4-spotted member of the *nanus* group, with sides of prothorax very strongly sinuate and elytron with only the sutural stria deeply impressed but with additional striae irregularly indicated. Proportions: head .73 and .76 width prothorax; prothoracic width/length 1.42 and 1.43, base/apex 1.27 and 1.23, base/head 1.13 and 1.09; width elytra/prothorax 1.51 and 1.48. *Measurements:* length 2.0-2.2; width 0.85-1.0 mm.

Type. One ♀ from "New Guinea (Wallace)," in British Mus.

Occurrence in New Guinea. **Papua**: 2, Dobodura, Mar.-July 1944 (Darlington). **N-E. N. G.**: 1, lower Busu R., Huon Peninsula, May 12, 1955 (E. O. Wilson, M.C.Z.), taken in lowland

rain forest; 1, Stephansort, Astrolabe Bay, 1898 (Biró, Hungarian National Mus.); 1, Aitape, Aug. 1944 (Darlington). **Neth. N. G.**: 1, Hollandia, July-Sept. 1944 (Darlington).

Measurements. The pair (♂ ♀) from Dobodura.

Notes. This very distinct species is the only truly arboreal *Tachys* that I know. My specimens were taken by beating foliage, especially dense clumps of leaves or moss-like epiphytes on the branches of low trees in the understory of rain forest. I suppose the species has invaded this habitat from the tree-trunk zone which the *nanus* group usually inhabits.

Tachys acuticollis Putzeys

Putzeys 1875, Ann. Mus. Civ. Genova (Genoa) **7**, p. 740.
Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, pp. 485, 492.

Description (for recognition only). A small, convex, shining black, conspicuously 4-spotted member of the *nanus* group Proportions: head .76 and .76 width prothorax; prothoracic width/length 1.46 and 1.43, base/apex 1.28 and 1.23, base/head 1.10 and 1.09; width elytra/prothorax 1.45 and 1.41. *Measurements:* length 1.9-2.4; width 0.85-1.05 mm.

Type. From Wokan, **Aru Islands** (O. Beccari, Genoa Civic Mus.).

Occurrence in New Guinea. Recorded by Andrewes from Hapan (Beccari), Ighibieri (Loria, Genoa Civic Mus.), and Geelvink Bay (Raffray and Maindron, Paris Mus.). I have additional material before me as follows: **Papua**: 15, Dobodura, Mar.- July 1944 (Darlington); 9, Oro Bay, Dec. 1943-Jan. 1944 (Darlington); 2, Bisianumu (near Sogeri), 500 m. (*c.* 1625 ft.) Mar. 1955 (E. O. Wilson, M.C.Z.), taken in rain forest; 1, Kiunga, Fly R., July 11-14, 1957 (W. W. Brandt, Bishop Mus.). **N-E. N. G.**: 6, lower Busu R., Huon Peninsula, May 1955 (E. O. Wilson, M.C.Z.); 1, Bubia (near Lae), Mar. 1955 (E. O. Wilson, M.C.Z.), taken in lowland rain forest; 1, Joangeng, Mongi Watershed, Huon Peninsula, 500 m. (*c.* 1625 ft.), Apr. 1955, (E. O. Wilson, M.C.Z.); 13, Sattelberg, Huon Gulf, 1899 (Biró, Hungarian National Mus.); 2, Stephansort, Astrolabe Bay, 1898 (Biró, Hungarian National Mus.); 1, Madang ("Friedrich-Wilh.-hafen"), 1896 (Biró, Hungarian National Mus.); 1, Korop, Upper Jimmi Valley, 1300 m. (*c.* 4275 ft.), July 12, 1955 (J. L. Gressitt, Bishop Mus.). **Neth. N. G.**: 3, Hollandia, May 1945 (B. Malkin, Malkin Coll.); 5, Maffin Bay, Aug. 1944 (Darlington); 5, same locality, Sept. 1944 (E. S. Ross, California Acad.); 1, Sansapor, Aug. 1944 (Darlington).

Measured specimens. A pair (♂ ♀) from Dobodura.

Notes. This species probably occurs at low altitudes throughout **New Guinea**, on the bark of fallen trees and logs in rain forest, and it occurs also on the **Aru Is.** (type locality), on Morotai Is. in the **Moluccas** (Darlington), and on **New Ireland** (E. J. Ford Jr., Bishop Mus.).

Tachys coracinus Putzeys

Putzeys 1875, Ann. Mus. Civ. Genova (Genoa) **7**, p. 739.
Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, p. 485, 491.
—— 1935 Fauna British India etc., Coleop. Carabidae **2**, pp. 299, 301 (see for synonymy and additional references).

Description (for recognition only). A rather small, convex, shining black (unspotted), 1-striate member of *nanus* group. Proportions: head .71 and .73 width prothorax; prothoracic width/length 1.61 and 1.60, base/apex 1.27 and 1.27, base/head 1.19 and 1.16; width elytra/prothorax 1.33 and 1.35. *Measurements:* length 2.0-2.2; width 0.85-0.95 mm.

Types. Described from Sarawak, **Borneo**, from a series of specimens of which some are in the Brussels Mns. and some in the Genoa Civic Mus. A single type has not been selected.

Occurrence in New Guinea. **N-E. N. G.**: 2, Stephansort, Astrolabe Bay, 1898 and 1897 (Biró, Hungarian National Mus.); 1, Wum, Upper Jimmi Valley, 840 m. (*c.* 2730 ft.), July 17, 1955 (J. L. Gressitt, Bishop Mus.). **Neth. N. G.**: 1, Hollandia, May 1945 (B. Malkin, Malkin Coll.).

Notes. T. coracinus is said by Andrewes (1935) to range from **Assam** and **Burma** south in the **Malay Archipelago** to **Celebes** and the **Philippines**, and the records given above extend the range to New Guinea. In general the area of distribution of this species is complementary to that of *acuticollis*, although they overlap to some extent.

Tachys singularis Group

This group is based on *Tachys singularis* Andrewes of Celebes. In his revision of Oriental *Tachys*, Andrewes included *singularis* in his *exaratus* group, which I have here combined with the *politus* group, but *singularis* and *yunax* (below) really have nothing to do with the more typical species of the *politus-exaratus* group. I have, therefore, made a new group characterized, briefly, by lack of foveae on the mentum, very strongly serrate elytral margins, 8th stria of elytron entire but rather

lightly impressed and irregular, and apical striole much nearer margin than suture (about in line of 5th stria) with a puncture just inside it much nearer its posterior than anterior end. Other characters are as in *politus* group, although, as I have said, I think there is no direct relationship. The strong serration of the elytral margins recalls the *serra* group, but that group has the mentum foveate, and the elytral striole and posterior elytral puncture are very differently placed; again I think there is no direct relationship. The position of the apical striole suggests a real relationship with the *nanus* group, but the claws of the *singularis* group are not denticulate, and the serrate elytral margins are different. This group is represented in New Guinea by one species which seems to be rather closely related to *singularis* of Celebes. This is reasonable enough — but, extraordinarily, the species from New Guinea seems to be identical with one I have described from the *West* Indies (see notes under following species)!

Tachys yunax Darlington

Darlington 1939, Mem. Soc. Cubana Hist. Nat. **13**, p. 87.

Description. With characters of *singularis* group as here defined. Form moderately broad, moderately convex; rather irregular reddish yellow with broad dark band across middle of elytra; rather dull, microsculpture distinct and isodiametric but rather lightly impressed on head, faint on pronotum, distinct and transverse on disc of elytra. *Head* .78 and .78 width prothorax; eyes moderately large and prominent, genae very short (*i.e.* posterior edge of eye almost reaches neck); antennae moderately long, (slightly more flattened than usual), middle segments about 2X long as wide, segment 2 equal to or slightly shorter than 3; frontal grooves short and poorly defined; mentum without foveae, toothed. *Prothorax* subquadrate-subcordate, width/length 1.56 and 1.50; base/apex 1.09 and 1.09; base/head 1.03 and 1.07; sides broadly but not strongly rounded in about anterior ¾, broadly sinuate posteriorly; apex subtruncate, faintly lobed at middle, with anterior angles scarcely advanced; base with very broad short truncate lobe at middle, sinuate at sides; posterior angles right, well defined, scarcely costate; lateral margins narrow anteriorly, broader and slightly explanate posteriorly, each with anterior seta about ⅓ from apex and posterior one just before basal angle; disc with usual impressions, but basal sulcus less impressed than in some groups, not

crenate, interrupted at middle, and with a broad, shallow, poorly defined median fovea. *Elytra* rather broad (E/P 1.47 and 1.44); margins rounded at humeri, ending inwardly about opposite bases of 4th striae, strongly dentate (serrate) behind humeri and less strongly so posteriorly; 3 inner discal striae moderately impressed and outer striae increasingly faintly indicated; stria 8 entire but rather shallow and irregular; apical striole farther to the side than usual, about in line of stria 5, with setigerous puncture inside it near elytral apex; 2 dorsal punctures on or just inside of 3rd stria about ¼ from base and ⅓ from apex. *Inner wings* fully developed. *Lower surface:* prosternum longitudinally impressed; anterior process of mesosternum not distinctly margined; last ventral without detectable pubescence (at 100X magnification) in both sexes. *Legs* normal; claws not serrate or at least not distinctly so. *Secondary sexual characters:* ♂ with two segments each front tarsus moderately dilated, squamulose below; ♂ with 1, ♀ 2 setae each side last ventral segment, the setae nearly in line in ♀. *Measurements* (New Guinean specimens): length 2.1-2.2; width 0.85-0.9 mm. (West Indian ones, 2.2-2.3 by *c.* 0.9 mm.).

Types. Holotype ♂ (M.C.Z. No. 23,509) and 69 paratypes all from Sánchez, **Dominican Republic**, West Indies.

Occurrence in New Guinea. **N-E. N. G.**: 9, "I. Deslacs" (Garove Is.), 1901 (Biró); 5, Madang ("Friedrich-Wilh.-hafen"), 1896 (Biró).

Other material. One Dobo, **Aru Is.**, 1908 (Merton, Budapest Mus.).

Measured specimens. Two (♂ ♀) from "I. Deslacs."

Notes. Although I have not compared this species directly with *singularis*, I have a camera-lucida drawing of the latter made at the British Mus. in 1948. Examination of this drawing and of Andrewes' description indicate that *yunax* is slightly larger than *singularis*, with more prominent eyes, and relatively slightly wider prothoracic base.

Biró's specimens were probably taken by sifting, although they are not so labeled. My West Indian specimens were all taken "under logs partly buried in woody debris thrown up at the head of Samaná Bay . . ." I did not find this species at any other locality during my extensive collecting in the West Indies, and Dr. P. Basilewsky, to whom I sent specimens, writes me that it is unknown in Africa. The limited information available suggests that it is native to New Guinea and perhaps other

parts of the Malay Archipelago, that it probably lives in logs as well as wood debris, and that it may somehow have been carried to the West Indies in timber.

Genus LIMNASTIS Motschulsky

Motschulsky 1862, Etude Ent. **11**, p. 27.
Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, p. 493.
Jeannel 1932, Soc. Ent. France, Livre du Centenaire, p. 170 (see for synonymy and additional references).
Andrewes 1935, Fauna British India etc., Coleop., Carabidae **2**, p. 302.

Diagnosis. See key to genera of Bembidiini (p. 399).

Description. None required here. See references given above. The species of *Limnastis* resemble slender, usually depressed, testaceous or partly brown *Tachys* with short but obvious dorsal pubescence.

Genotype. Lymnaeum indicum Motschulsky of tropical Asia (*t.* Jeannel).

Generic distribution. The warmer part of the Old World; Tenerife in the eastern Atlantic Ocean; Cuba and part of Central America; and the Hawaiian Is. in the Pacific.

Notes. Limnastis inhabits ground-litter and loose soil, often in damp places but not specifically by open water. Individuals are sometimes common in flood debris or at light but are not often seen otherwise. Some African species are blind, and so is *L. inops* of New Guinea (described below). Not many more than a dozen species of the genus are known, against more than 500 species of *Tachys*. That 2 of the few species of *Limnastis* but (so far as I know) no species of *Tachys* are blind suggests some important difference between these genera in habits or genetic composition or history.

Key to Species of Limnastis of New Guinea

1. Eyes lacking; wings vestigial (p. 486) ..... *inops*
— Eyes present; wings fully developed 2
2. Base prothorax *c.* ¼ wider than apex (base/apex 1.28 and 1.22); 1 seta over each eye; color testaceous usually with head dark and discal elytral cloud brownish (p. 485) ..... *atricapillus*
— Base prothorax *c.* 1/10 wider than apex (base/apex 1.12 and 1.09); 2 setae over each eye (the anterior shorter); color nearly uniform testaceous (p. 485) ..... *pilosus*

Limnastis atricapillus Bates

Bates 1892, Ann. Mus. Civ. Genova (Genoa) **32**, p. 297.
Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, pp. 494, 496.
Jeannel 1932, Soc. Ent. France, Livre du Centenaire, pp. 174, 177.

Description. See key above. Proportions: head .67 and .68 width prothorax; prothoracic width/length 1.35 and 1.31, base/-apex 1.28 and 1.22, base/head 1.25 and 1.22; width elytra/prothorax 1.42 and 1.47. *Measurements:* length 1.9-2.2; width 0.75-0.85 mm.

Type. From Katha, **Burma** (L. Fea, Genoa Civic Mus.).

Occurrence in New Guinea. **Neth. N. G.**: 24, Maffin Bay, Aug. 1944 (Darlington); 8 Hollandia, July-Sept. 1944 (Darlington).

Measured specimens. A pair (♂ ♀) from Maffin Bay.

Notes. This species is now known to occur in **Burma**, **Borneo**, Mindanao in the **Philippines** (C. F. Clagg, M.C.Z.), and **New Guinea**, but I have not seen it from Australia. My specimens were taken by washing out leaf mold and loose earth in damp, shady places.

Limnastis pilosus Bates

Bates 1892, Ann. Mus. Civ. Genova (Genoa) **32**, p. 296.
Andrewes 1925, Ann. Mus. Civ. Genova (Genoa) **51**, pp. 494, 495.
Jeannel 1932, Soc. Ent. France, Livre du Centenaire, pp. 175, 179 (see for "subspecies" and additional references).
Andrewes 1935, Fauna British India etc., Coleoptera, Carabidae **2**, pp. 304, 305.
Tachys setiger Sloane 1903, Proc. Linn. Soc. New South Wales **28**, p. 582.
—— 1921, Proc. Linn. Soc. New South Wales **46**, p. 208.

Description. See key above. Proportions: Head .64 and .66 width prothorax; prothoracic width/length 1.32 and 1.28, base/apex 1.12 and 1.09, base/head 1.20 and 1.16; width elytra/prothorax 1.45 and 1.41. *Measurements:* length 1.9-2.2; width 0.75-0.85 mm. (same as for *atricapillus*).

Types. Of *pilosus*, from **Burma**, type in Genoa Civic Mus. (*t.* Andrewes 1925) and "cotypes" in Andrewes Collection, British Mus. Of *setiger*, from Townsville, **Australia**, in Sloane collection at Canberra (seen by me in 1957).

Occurrence in New Guinea. **Papua**: 1, Milne Bay, Dec. 1943 (Darlington). **N-E. N. G.**: 1. Erima, Astrolabe Bay, 1896 (Biró, Hungarian National Mus.). **Neth. N. G.**: 1, Hollandia, July-Sept. 1944 (Darlington).

Notes. *Limnastis pilosus* is now known to occur in **India**, **Burma** etc., **Formosa**, **Sumatra**, **Java**, **Borneo**, the **Philippines**, **Celebes**, the **Moluccas** (Morotai Is.), **New Guinea**, **New Britain** (Cape Gloucester), and eastern **Australia** from the Cape York Peninsula to Melbourne. Jeannel has divided the species into subspecies, but his material was inadequate: he raised the Australian *setiger,* considered a synonym by Sloane and Andrewes, to subspecific rank apparently without seeing any specimens, because "Il est à présumer qu'elle représente au moins une race geographique . . ." Real study of the geographical variation of the species is needed but I cannot take time for it now. It should be remembered that the winged species of *Limnastis* fly readily — they often fly to light — and that such small, flying insects may be dispersed long distances through the air. There is reason to think that *Limnastis* has been carried across the Atlantic from Africa to the West Indies by wind (Darlington 1938, *American Naturalist* **72**, pp. 521, 533).

Limnastis inops n. sp.

Description. Form as figured (fig. 46); rather large, slender, moderately convex; testaceous; dull, entire upper surface with reticulate microsculpture nearly isodiametric (slightly irregular and transverse) on head, more irregular but not strongly transverse on pronotum and elytra. *Head* small, .57 and .59 width prothorax; eyes absent; antennae rather heavy, middle segments (without pubescence) about 2X long as wide, segments 2 and 3 subequal; front slightly, nearly evenly convex, with frontal sulci broad, slightly impressed, poorly defined; 2 supraorbital setae each side; mentum with a small tooth at middle of emargination. *Prothorax* subquadrate; width/length 1.09 and 1.12; base/apex 1.25 and 1.25; base/head 1.52 and 1.46, sides slightly arcuate in about anterior ⅔, slightly but very broadly sinuate before base; base and apex subtruncate; basal angles sharply defined, right-acute; 2 lateral setae each side, the anterior just inside margin about ⅓ from apex, the posterior a little in from side and farther in from base; disc without anterior transverse impression; middle line long, slightly impressed; basal sulcus scarcely indicated; baso-lateral impressions absent; basal margin beginning on each side of angle and running obliquely in and slightly forward toward middle (but widely interrupted at middle); disc rather sparsely punctate as well as microreticulate. *Elytra* long, widest about middle, with sides

slightly arcuate and apices subtruncate; width elytra/prothorax *c.* 1.36 and 1.31; humeri prominent, narrowly rounded, margins behind them strongly serrate, and area above each humerus depressed and vaguely carinate; striae vaguely indicated but none (not even sutural) sharply impressed; surface of elytra sparsely punctate about like pronotum; each elytron with a seta-bearing puncture on outer edge 3rd interval slightly behind middle and another (slightly further from suture) near apex. *Inner wings* atrophied. *Lower surface* microreticulate and sparsely and inconspicuously pubescent. *Legs* apparently normal; all tarsi 5 segmented. *Secondary sexual characters* apparently normal: ♂ with first two segments each front tarsus widely dilated and squamulose below and with one seta each side last ventral segment; ♀ unknown. *Measurements:* length 2.7-2.9; width 0.95-1.0 mm.

Types. Holotype ♂ (M.C.Z. No. 30,214) and one broken ♂ paratype from Chimbu Valley, Bismarck Range, **N-E. N. G.**, 5000-7500 ft., Oct. 1944 (Darlington). Both specimens were taken under a deeply buried stone at the foot of a high limestone ridge.

Occurrence in New Guinea. Known only from the types.

Measured specimens. The types.

Notes. So far as I know, the only previously known blind *Limnastis* is *L. gaudini* Jeannel of Tenerife. The present new species differs from it not only in details of form but in having strongly serrate elytral margins and a seta-bearing puncture on 3rd elytral interval not far behind middle. The discovery of this insect associated with limestone suggests that there may be other blind Carabidae in the vicinity, perhaps in caves, of which there were said to be some not far away, although I was not able to reach them. (I now find that additional blind *Limnastis* have been described from Africa by Basilewsky 1951, Rev. Zool. Bot. Africaines **44**, pp. 283, 285, and **45**, p. 85.)

Tribe TRECHINI

This tribe is characterized by, among other things, very long, deep frontal sulci, which curve outward behind the eyes, so that the latter are on raised ocular hemispheres. The tribe has been monographed by Jeannel (who treated it as a subfamily) in *L'Abeille* in 3 parts (Vol. **32**, No. 3, 1926; Vol. **33**, 1927; Vol. **35**, 1928). The tribe is nearly world-wide but is irregularly distributed: flightless forms not associated with running water

occur mostly in the temperate zones north and south of the tropics, while winged, stream-side genera occur across the tropics in both Old and New Worlds (for some further details see Darlington 1959, *Pacific Insects* **1**, pp. 341-345). Many northern forms of the tribe are cave-dwellers and so are a few in New Zealand (Britton 1958, *Proc. R. Ent. Soc.* London (B) **27**, pp. 183-188), but no Australian Trechini live in caves so far as known.

Only two genera of the tribe are known in New Guinea. They are related to each other, and both are winged and live in gravel by running water. The absence of flightless mesophile Trechini even on the mountains in New Guinea is noteworthy.

Key to Genera of Trechini of New Guinea

1. Pronotum with normal lateral margins; elytral margins extending anteriorly around humeri to bases of 5th striae (p. 488) . . . *Perileptus*
— Pronotum without lateral margins; elytral margins ending anteriorly at humeri (p. 489) . . . . . *Perileptodes*

Genus PERILEPTUS Schaum

Schaum 1860, Naturgeschichte Ins. Deutschlands **1**, p. 663.
Jeannel 1923, L'Abeille **32**, p. 402 (see for synonymy and additional references).
Andrewes 1935, Fauna British India etc., Coleop., Carabidae **2**, p. 48.

Diagnosis. See under tribe and in key, above.

Description. None needed here. See references, above.

Genotype. Carabus areolatus Creutzer, of Europe etc.

Generic distribution. Tropical and warm-temperate parts of the old World, the Canary and Cape Verde Is. in the Atlantic, and the West Indies (Greater Antilles) in America (for possible explanation of this distribution, see discussion and reference in notes under *Limnastis pilosus,* above).

Notes. In the Asiatic-Australian area, *Perileptus* occurs in southern Asia north to Japan, across the Malay Archipelago to the Philippines, Moluccas, and the *western* tip of New Guinea (and a species has been described from the New Hebrides by Jeannel 1938, *Rev. Francaise Ent.* **5**, p. 171), and in eastern Australia from at least part of the tropical Cape York Peninsula south at least to warm-temperate New South Wales. However the genus seems to be entirely replaced in the main part of New Guinea by *Perileptodes,* which therefore interrupts the range of *Perileptus.* The present distribution of species suggests

that *Perileptus* is invading or re-invading New Guinea. Two species, which I identify tentatively as *japonicus* Bates and *platypterus* Jeannel (both Oriental), reach the Moluccas (Morotai Is.), and one of them (*japonicus*) extends to the Bird's Head of western New Guinea. The species of *Perileptus* live in the gravel banks and bars of brooks and rivers.

Perileptus japonicus Bates

Bates 1873, Trans. Ent. Soc. London **1873**, p. 296.
Jeannel 1926, L'Abeille **32**, pp. 406, 414, figs. 188, 189 (see for additional references).

Description. A rather dull, testaceous to blackish *Perileptus* with eyes large (in genus) and with posterior prothoracic angles broadly formed (not minutely prominent), nearly rectangular. Proportions: head .95 width prothorax; prothoracic width/length 1.32, base/apex (not calculated), base/head .72; width elytra/prothorax 1.30. *Measurements:* length *c.* 2.2; width *c.* 0.7 mm. (specimens from Morotai are usually larger).

Type(s). From Hiogo; **Japan** (Lewis, British Mus.).

Occurrence in New Guinea. **Neth. N. G.**: 1 ♀, Sansapor (Vogelkop), Aug. 1944 (Darlington).

Measured specimen. The ♀ from Sansapor.

Notes. Jeannel records *japonicus* from **Japan**, **Hong Kong**, and **Celebes**, and my series from Morotai in the **Moluccas** and the single specimen from western **New Guinea** seem structurally similar, though smaller and darker than Japanese specimens.

Genus Perileptodes Jeannel

Jeannel 1926, L'Abeille **32**, pp. 402, 430.

Diagnosis. See preceding key.

Description. See Jeannel's description, and figures of *pilifer* (below). But note that Jeannel's statement that the ♂ front tarsi are unmodified ("absolument semblables à ceux des femelles") is not correct. Each ♂ front tarsus has the first 2 segments slightly but distinctly widened, and each of these segments has a long, sickle-shaped scale beneath it. This is the case in both species of the genus.

Genotype. P. pilifer Jeannel.

Generic distribution. Widely distributed in New Guinea; unknown elsewhere.

Notes. The two distinct species of this genus occur at the same localities over much of New Guinea, but only one of them

(*pilifer*) is known in the extreme east of the island, in Papua. Both (like *Perileptus*) live in gravel by running water, but whether their habitats are precisely identical I do not know. Both species vary geographically, but I have not been able to define useful subspecies.

Key to Species of Perileptodes

1. Posterior angles of pronotum a little before base, dentiform, acute, more or less divergent; usually smaller, length 2.2–2.7 mm. (p. 490) *pilifer*

— Posterior angles of pronotum at or near base, or not distinctly dentiform; usually larger, length 2.7–3.6 mm. (and see notes under this species) (p. 491) *jeanneli*

Perileptodes pilifer Jeannel

Jeannel 1926, L'Abeille **32**, p. 431, figs. 211–216.

Description. See preceding key, and Jeannel's description. Proportions: head .88 and .88 width prothorax; prothoracic width/length 1.27 and 1.23, base/apex (not calculated), base/-head .66 and .63; width elytra/prothorax *c.* 1.33 and 1.38. *Measurements:* length 2.2-2.7; width 0.7-0.9 mm.

Type. From Kapakapa (south coast of **Papua**), collected by L. Loria, in Jeannel collection, Paris Mus.

Occurrence in New Guinea. **Papua**: 6, Dobodura, Mar.-July 1944 (Darlington); 11, Oro Bay, Dec. 1943-Jan. 1944 (Darlington). **N-E. N. G.**: 11, Nadzab, July 1944 (Darlington); 5, Lae, Oct. 1944 (Darlington); 8, Sambeang, Mongi Watershed, Huon Peninsula, 400 m., Apr. 21, 1955 (E. O. Wilson, M.C.Z.); 37, Chimbu Valley, Bismarck Range, 5,000-7,500 ft., Oct. 1944 (Darlington). **Neth. N. G.**: 2, Sansapor (Vogelkop), Aug. 1944 (Darlington).

Measured specimens. A pair (♂ ♀) from Chimbu Valley.

Notes. This species varies in details of the dentiform posterior angles of pronotum and in coarseness of punctures of discal elytral striae, which are sometimes so coarse that the fixed discal punctures are almost lost among them (*cf.* Jeannel's figure 211, in which the strial punctures are fine and the fixed punctures conspicuous). The variation is partly geographical, but individual variation prevents recognition of distinct subspecies.

PERILEPTODES JEANNELI n. sp.

Description. Form (fig. 47) about as in *P. pilifer* but larger; black, elytra often brown discally; appendages brown; shining, dorsal surface without distinct microsculpture but rather sparsely punctate, each puncture with a rather long semi-erect hair. *Head* large, .93 and .91 width prothorax; eyes prominent, genae oblique; antennae long, middle segments 3X to 4X as long as wide (without pubescence), segment 3 much longer than 2 and somewhat longer than 4, all segments including scape pubescent; frontal grooves deep and curved as usual; front irregularly depressed, separated from clypeus by a deep transverse groove; clypeus with a second deep transverse groove slightly before middle, punctate anteriorly; labrum rather deeply emarginate; mentum strongly toothed. *Prothorax* cordate; width/length 1.21 and 1.21; base very narrow; base/apex not calculated (apical angles so indistinct that apex cannot be exactly measured); base/head .57 and .59; sides strongly rounded anteriorly, then weakly and irregularly rounded and strongly converging to strong basal sinuations; lateral margins obliterated but marginal setae present about 1/6 from apex and at basal angles; apex subtruncate, rounded into sides without distinct anterior angles; base subtruncate; posterior angles right, sometimes slightly irregular or subdentiform but not strongly divergent; disc not strongly convex, with anterior transverse impression subobsolete, middle line very deeply impressed, basal sulcus impressed but rather irregular, with area behind it coarsely rugose. *Elytra* about 1/2 wider than prothorax (E/P 1.47 and 1.53), widest about middle, with sides slightly arcuate, then each obliquely subtruncate at apex; humeri moderately prominent but obtusely rounded; lateral margins ending at humeri (no basal margins); each elytron with sutural stria deeply impressed in posterior 3/4, obsolete or less sharply impressed anteriorly, but becoming very deep again at extreme base (or suture elevated); other striae absent; 3 "fixed" punctures on (position of) 3rd interval (but nearly lost in the general pubescence). *Inner wings* fully developed. *Lower surface* with episterna mostly smooth, but most of rest of surface punctate and pubescent. *Legs* rather long and slender but apparently without unusual characters. *Secondary sexual characters:* ♂ tarsi as described for genus; ♂ with 1, ♀ 2 setae each side last ventral segment. *Measurements:* length 3.1-3.6; width *c.* 1.1-1.2 mm. (type series). Specimens

from lower altitudes in N-E. N. G. measure 2.7-3.3; from Sansapor in western Neth. N. G., *c.* 2.9 mm.

Types. Holotype ♂ (M.C.Z. No. 30,215) and 30 paratypes all from Chimbu Valley, Bismarck Range, **N-E. N. G.**, 5000-7500 ft., Oct. 1944 (Darlington).

Other material. **N-E. N. G.**: 1, Nadzab, July 1944 (Darlington); 8, Lae, Oct. 1944 (Darlington); 11, Sambeang, Mongi Watershed, Huon Peninsula, 400 m. (*c.* 1300 ft.), Apr. 21, 1955 (E. O. Wilson, M.C.Z.). **Neth. N. G.**: 2, Sansapor, Aug. 1944 (Darlington).

Measured specimens. The ♂ holotype and one ♀ paratype.

Notes. Typical specimens of this new species differ from *pilifer* in being much larger and darker; specimens of the two species from Chimbu Valley are instantly separable by size alone. Specimens from Nadzab, Lae, and Sambeang are smaller but still usually obviously larger and darker than *pilifer* from the same localities. The two specimens from Sansapor are rather small, hardly larger than *pilifer* from the same locality, but are very smooth, while the two *pilifer* from Sansapor have the elytral striae on the disc so coarsely punctate that the anterior fixed punctures are almost lost among the strial punctures (the size of the strial punctures varies individually in some localities). These facts suggest that there are two basic species of this genus, both widely distributed in New Guinea, which are perfectly distinct from each other in any given locality although the characters distinguishing them may differ somewhat from place to place. It might be possible to divide one or both species into geographical subspecies, but the situation is so complex that I do not care to attempt it now.

Tribe PANAGAEINI

Panagaeines are rare insects in New Guinea. I have seen from there only 7 specimens representing 3 genera and species. A fourth genus may occur: *Craspedophorus*, which is widely distributed in the Old World tropics and which, in the Asiatic-Australian area, is now known from southern Asia to Sumatra, Java, Borneo, and the Philippines, and in a separate area which includes much of Australia north to the tip of Cape York (and Horn Is. north of the tip) and which may reach southern New Guinea, although it is not yet recorded there. This genus is included (in parentheses) in the following key but is not formally treated here. The genotype of *Craspedophorus* is *Carabus*

reflexus Fabricius 1781 (not 1801) of Africa (fixed by Basilewsky 1953, *Exploration du Parc National de l'Upemba,* Fasc. 10, p. 171).

Panagaeines are in general ground-living, mesophile Carabidae, not usually associated with open water. Different ones occur in both humid and arid regions. Wing atrophy is common in this tribe, but the species actually known from New Guinea are all winged. In *Craspedophorus,* however, the wings have atrophied.

Key to Genera of Panagaeini that occur (or may occur) in New Guinea

1. Labrum with middle pair of setae much farther forward than lateral pair; paraglossae not prolonged beyond apex of ligula; (color above, including sides of pronotum, uniform bluish or greenish black; legs rufous) (p. 493) ... ... *Trichisia*
— Labrum with middle pair of setae not much farther forward than lateral pair; paraglossae prolonged beyond apex of ligula; (usually spotted; if elytra uniformly dark, at least sides of pronotum paler posteriorly) ... 2
2. Fourth segment hind tarsi strongly lobed (p. 494) ... *Dischissus*
— Fourth segment hind tarsi emarginate but not strongly lobed ... 3
3. Male front tarsi usually slightly dilated and (in New Guinean species) with sexual pubescence below; winged (p. 495) ... *Microschemus*
— Male front tarsi not modified; wings vestigial (and metepisterna often much shortened, but this is a variable character) ... (*Craspedophorus*)

Genus TRICHISIA Motschulsky

Motschulsky 1864, Bull. Soc. Nat. Moscou **37**, Part 2, No. 4, p. 331.
Csiki 1929, Coleop. Cat., Carabidae, Harpalinae **3**, p. 364 (see for additional references).

Diagnosis. See preceding key to genera of Panagaeini.

Description. None needed here.

Genotype. Trichisia cyanescens Motschulsky, of southern Asia ("Ind. orientale").

Generic distribution. Southern Asia and the Malay Archipelago to tropical Australia; and apparently part of Africa.

Notes. The species of *Trichisia* differ from each other by rather slight characters of color, proportions, and sculpture, and some of the characters vary individually. I think it likely that all the Asiatic-Australian forms of the genus are modifications of 1 or at most 2 stocks. However I am not now prepared to suggest changes in their taxonomy or nomenclature.

Trichisia papuana Csiki

Csiki 1907, Ann. Mus. Nat. Hungary **5**, p. 576.

Description (for recognition only). A broad, greenish blue (with red or testaceous legs), unspotted, winged species, *c.* 11 mm. long. Proportions: head .53 and .52 width prothorax; prothoracic width/length 1.44 and 1.42, base/apex (not calculated), base/head 1.52 and 1.57; width elytra/prothorax 1.35 and 1.38. *Measurements:* length *c.* 11; width *c.* 4.7-5.0 mm. (my measurement of the type is *c.* 11 x 4.7 mm.).

Type. A ♀ (dissected) from Madang (Friedrich-Wilhelmshafen), **N-E. N. G.**, collected in 1896 by L. Biró, now in Hungarian National Mus.

Occurrence in New Guinea. **N-E. N. G.**: the type. **Papua**: 1 ♀ (dissected), Nari (Mudge) Is. (east of the eastern tip of New Guinea), Nov. 4, 1917 (J. T. Zimmer, Chicago Mus.).

Measured specimens. The ♀ type and the ♀ from Nari Is.

Notes. Csiki considered this species related to *T. azurea* of Australia but broader, slightly different in color, with elytral intervals lightly but evidently wrinkled. However comparison of Csiki's type (which I have been able to examine through the courtesy of Dr. Z. Kaszab) with Australian specimens shows no significant difference in form, and other differences are slight. More material is needed to show whether the New Guinean form differs from the Australian one by any constant characters.

Genus Dischissus Bates

Bates 1873, Trans. Ent. Soc. London **1873**, p. 243.

Chaudoir 1878, Ann. Soc. Ent. Belgique **21**, pp. 85, 149.

Csiki 1929, Coleop. Cat., Carabidae, Harpalinae **3**, p. 363 (see for additional references).

Andrewes 1939, Ann. Mag. Nat. Hist. (11) **3**, p. 134.

Diagnosis. Small, rather slender, quadri-maculate, winged panagaeines, with characters indicated in the preceding key to genera.

Description. None required here. See Chaudoir.

Genotype. Dischissus mirandus Bates, of Japan (fixed by Andrewes 1939).

General distribution. Africa and southern Asia north to Japan and south and east across the islands to New Guinea.

Notes. A single Oriental species of this genus extends to New Guinea.

Dischissus notulatus (Fabricius)

Fabricius 1801, Systema eleutheratorum **1**, p. 201 (*Carabus*).
Chaudoir 1878, Ann. Soc. Ent. Belgique **21**, p. 115.
Csiki 1929, Coleop. Cat., Carabidae, Harpalinae **3**, p. 363 (see for synonymy and additional references).
Andrewes 1933, Trans. Ent. Soc. London **81**, p. 5.

Description. None required here; see generic diagnosis. Proportions: head .62 and .59 width prothorax; prothoracic width/-length 1.30 and 1.32, base/apex (not calculated), base/head 1.18 and 1.20; width elytra/prothorax 1.36 and 1.30. *Measurements:* length c. 7.7-8.7; width c. 3.0-3.3 mm.

Type. Fabricius' type, from "Bengalia," is in the Copenhagen University Mus.

Occurrence in New Guinea. **Papua**: 1 ♀, Fly R. 5 miles below Palmer R., May 14-22, 1936, and 1 ♀, Lake Daviumbu, Fly R., Aug. 19-30, 1936 (both Archbold Expedition, A.M.N.H.).

Measured specimens. The 2 ♀ ♀ listed above.

Notes. This species is known from **southeastern Asia**, **Sumatra**, **Java** (Andrewes Collection), and the **Philippines**, and presumably occurs on other islands between Asia and **New Guinea**. The Fly R. specimens were probably collected in light traps, for there are scales of Lepidoptera on them.

Genus Microschemus Andrewes

Andrewes 1940, Ann. Mag. Nat. Hist. (11) **5**, p. 536 (new name for *Microcosmus* Chaudoir).
Microcosmus Chaudoir 1878, Ann. Soc. Ent. Belgique **21**, pp. 85, 139.
Csiki 1929, Coleop. Cat., Carabidae, Harpalinae **3**, p. 361 (see for additional references).
Andrewes 1939, Ann. Mag. Nat. Hist. (11) **3**, p. 135.

Diagnosis. Small, broad, winged panagaeines, characterized (in New Guinea) as indicated in the preceding key to genera. Typically, the anterior tarsi of the ♂ are somewhat dilated but without special pubescence, but in the New Guinean species the ♂ tarsi are scarcely dilated but have some sexual pubescence below.

Description. None required here. Chaudoir gives the characters of the genus in detail.

Genotype. Panagaeus cruciatus Dejean, of Africa (fixed by Andrewes 1939).

Generic distribution. Africa, southern Asia north to Japan and south and east across the Malay Archipelago to tropical Australia.

Notes. Only 1 species of this genus occurs in the Australian Region, including New Guinea. It was described by Csiki as a *Trichisia*.

Microschemus quadrimaculatus (Csiki)

Csiki 1907, Ann. Mus. Nat. Hungary **5**, p. 577 (*Trichisia*).

Description (for recognition only). A small, broad, winged species (form as figured, fig. 48); color black with sides of pronotum reddish posteriorly and elytra either with or without pale maculae (in the maculate form each elytron has a submarginal posthumeral blotch and a subapical one). Proportions: head .53 and .56 width prothorax; prothoracic width/length 1.58 and 1.50, base/apex (not calculated), base/head 1.60 and 1.62; width elytra/prothorax 1.32 and 1.28. *Measurements:* length *c.* 7.5-8.0; width *c.* 3.2-3.5 mm. (my measurement of type: *c.* 8 x 3.5 mm.).

Type. A ♀ (dissected) from Madang (Friedrich-Wilhelmshafen), **N-E. N. G.**, collected in 1896 by L. Biró, in Hungarian National Mus.

Occurrence in New Guinea. **N-E. N. G.**: the type from Madang and 1 additional (♂) specimen from the same locality, also collected in 1896 by Biró (Hungarian National Mus.). **Papua**: 1 ♂, Dobodura, Mar.-July 1944 (Darlington).

Measured specimens. The type (♀) and 2nd specimen (♂) from Madang.

Notes. I have assigned this species to *Microschemus* in spite of the fact that the ♂ anterior tarsi are scarcely dilated and are pubescent below. Otherwise the New Guinean species seems to be a *Microschemus* and I do not want to multiply genera unnecessarily.

This species seems to be strikingly dimorphic in color. The type is quadrimaculate, but the second specimen from Madang has the elytra without trace of spots and so does the specimen from Dobodura. More specimens are needed to show whether this variation is strictly dimorphic or whether intermediate color forms occur.

This species occurs also in tropical Queensland, **Australia**. I took 4 specimens, including both sexes, west of Ravenshoe on the Atherton Tableland in Feb. 1958. They are all spotted, the spots being somewhat larger than in the type of *quadrimaculatus*. The genus has not previously been reported from Australia. The Australian specimens were taken in clumps of

grass around the edge of a shallow flooded pond in relatively open (sparsely forested) country. My Dobodura specimen was taken at light.

Tribe PTEROSTICHINI

A considerable proportion of the medium-sized (or less often small or large) ground-living (or often semi-aquatic but rarely arboreal) Carabidae of the world are Pterostichini. The tribe is world-wide in distribution but is not evenly distributed. Within the Australian region Pterostichini are very numerous in Australia but relatively few in New Guinea, where they are replaced as dominant Carabidae by species of the tribe Agonini. I have elsewhere (*Psyche* 1956, **63**, pp. 1-3) discussed this general complementarity and have suggested that it is due to a complex combination of ecological, historical, and geographical factors. Over the world as a whole, there is a tendency for Agonini to be better represented in the tropics, Pterostichini, in the temperate zones, although this zonal complementarity is not strongly defined. Also it is probable that Agonini are more recent in origin than Pterostichini and that they have dispersed more recently. However, the dispersal of each group has been very complex, and even the Agonini dispersed long enough ago to have reached all parts of the world and to have differentiated to some extent in different regions. I base this hypothesis, of the more recent rise and dispersal of Agonini, chiefly on the lesser diversity of this tribe as compared with Pterostichini. If all this is correct, Pterostichini are dominant in Australia partly because Australia is more temperate than tropical in climate and partly because Pterostichini reached Australia before Agonini did, and Agonini are dominant in New Guinea partly because the climate there is fully tropical and partly because the carabid fauna of New Guinea is more recent in its origins than that of Australia.

I shall not attempt a formal characterization of the tribe Pterostichini. Briefly, Pterostichini are similar to Agonini but usually have the outer margins of the elytra interrupted before the apex. The margins are not interrupted in Agonini. However, there are exceptions to this character (see notes under *Lesticus toxopei,* descriptions of *Paraloma* and *P. fortis,* and notes under *Haploferonia* and *Nebrioferonia*). If there are genitalic characters that really separate Pterostichini and Agonini, I cannot give them. The parameres are diverse in Pterostichini even among the few genera in New Guinea (figs. 63-70), and

seem to give no simple character to define the tribe. Perhaps I should add that Agonini are probably derived from Pterostichini and are sometimes treated as a special group of the latter.

The Pterostichini of New Guinea are rather diverse taxonomically, much more so in proportion to number of species than New Guinean Agonini are. That is, the Pterostichini of New Guinea represent relatively more separate ancestors but fewer species produced by local radiations. Nevertheless, many Australian genera, and also some Oriental ones that extend to the western part of the Malay Archipelago, are unrepresented in New Guinea. The pterostichine fauna of the island is therefore depauperate both in basic stocks and in total number of species. In terms of present distributions (regardless of origins) this fauna is a mixture of some chiefly Oriental or Old-World-tropical elements, some (but fewer) Australian elements, and some (but probably still fewer) endemic ones. The chiefly Oriental or Old-World-tropical elements include *Morion* (the New Guinean species of this genus are not directly related to the endemic Australian ones), *Brachidius, Caclostomus, Abacetus, Lesticus,* and *Cosmodiscus.* The Australian elements include *Mecyclothorax, Catadromus, Prosopogmus,* and *Loxandrus.* The endemic elements include most of the few genera known from New Guinea that are not listed in the last two sentences. This geographical classification of genera is, as I have said, based on existing distributions. It does not necessarily mean that the genera in question have actually been derived from the regions indicated. I think that in fact the Oriental elements probably have reached New Guinea from the Oriental Region but that some of the so-called Australian elements may not have come from Australia. For example, *Mecyclothorax* now occurs in Australia but not in Asia, with a few species scattered on high mountains in the Malay Archipelago, but *Mecyclothorax* has reached the Hawaiian Is., and it seems likely that it did so when it was more widely distributed on the continents than now and that it has retreated into Australia rather than spread from there. This is more clearly the case with *Loxandrus. Loxandrus* now occurs in Australia and New Guinea (and west to Celebes) and in the warmer part of the Americas. This great discontinuity suggests that the genus is retreating and has not spread from either of its present areas of occurrence.

Winged, dimorphic, and flightless pterostichines now occur on New Guinea, but their ancestors may all have been winged when they reached the island, the wings then atrophying locally

in several stocks. There are no relicts of old flightless groups of Pterostichini on New Guinea. This is a significant fact, in view of the large number of wholly flightless genera of the tribe in Australia.

The following key to genera of Pterostichini of New Guinea is based in part on works of Chaudoir, Tschitschérine, Sloane, Andrewes, and Straneo. Although I have used phylogenetic characters where they are obvious and convenient, the key as a whole is not phylogenetic but is in part superficial, designed primarily for identification. The Pterostichini of New Guinea are too few and too unrepresentative of the tribe as a whole to justify phylogenetic treatment. I have for the most part avoided characters based on mouth parts (although these are fundamental in pterostichine taxonomy) because they are often hard to see in ordinary specimens and because even specialists are often mistaken in their descriptions of them.

One Australian pterostichine genus, *Pocciloidea*, that is recorded from New Guinea probably does not really occur there. The only New Guinean record for the genus is "*Pocciloidea*" *ornata* Tryon, which is probably not a *Pocciloidea* and not even a pterostichine but a synonym of *Hololeius ceylanicus*, which will be treated in Part III of the present work.

Key to Genera of Pterostichini of New Guinea

1. Front tibia with outer apical angle strongly produced; (form parallel; head large; antennae moniliform) (p. 500) ..... *Morion*
— Front tibia with outer apical angle not produced; (other characters variable) 2
2. Small, compact; antennae moniliform; elytron with basal pore (if present) at base 3rd stria 3
— Size and form variable; antennae usually not moniliform; elytron with basal pore (if present) near or inside base 2nd stria (not counting scutellar striole, if present) 4
3. Elytron without basal pore; anterior-lateral prothoracic setae almost on anterior angles (p. 507) ..... *Brachidius*
— Elytron with basal pore (at base 3rd stria); anterior-lateral prothoracic setae *c.* 2/5 prothoracic length behind anterior angles (p. 508) *Caelostomus*
4. Mandibles with setae in scrobes; small and (in New Guinea) high-mountain-living (p. 505) ..... *Mecyclothorax*
— Mandibles without setae in scrobes; size and habitat variable 5
5. Antennae with segment 2 attached to 1 more eccentrically than usual; (small, 4.7–6.8 mm., and in New Guinea, water-loving species) (p. 517) ..... *Abacetus*

— Antennae with segment 2 attached to 1 less eccentrically; (size and habitat variable) 6

6. Antennae each with 4 basal segments glabrous; size very large, length (in New Guinea) *c.* 50 mm. or more (p. 563) ..... *Catadromus*

— Antennae with 3 basal segments glabrous; size much smaller 7

7. Abdomen with last 3 ventral segments transversely impressed or margined at base at least toward sides 8

— Abdomen with ventral segments not thus impressed or margined 10

8. Elytron with 10th interval absent or not distinct from margin (p. 536) *Prosopogmus*

— Elytron with a distinct 10th interval at least posteriorly 9

9. Elytra with 3rd intervals impunctate; scutellar striae absent; proepisterna longitudinally wrinkled (p. 533) ..... *Rhytiferonia*

— Elytra with 3rd intervals with fixed punctures; scutellar striae present (except when other striae obsolete); proepisterna not wrinkled (but often punctate) (p. 521) ..... *Lestieus*

10. Small, broad (prothoracic width/length *c.* 1.55-1.71), compact (superficially somewhat similar to *Brachidius* but with antennae less stout and basal pore of elytron present, at base stria 2) (p. 513) ..... *Cosmodiscus*

— Size small to large, but never so broad and compact 11

11. Elytra with 3rd interval 1-punctate; (scutellar striae absent or nearly so) 12

— Elytra with 3rd interval impunctate 15

12. Antennae "almost geniculate," segment 1 longer than 2 and 3 together (genus placed tentatively from description; see notes under genus) (p. 516) ..... *Homalonesiota*

— Antennae not geniculate, segment 1 shorter than 2 and 3 together 13

13. Metepisterna (not including posterior lobes) scarcely longer than wide (p. 547) ..... *Haploferonia*

— Metepisterna longer than wide 14

14. Prothorax not cordate (p. 549) ..... *Loxandrus*

— Prothorax cordate (p. 557) ..... *Nebrioferonia*

15. Very small (4.0-4.5 mm.); scutellar stria lacking (p. 560) ..... *Tiferonia*

— Larger; scutellar stria present 16

16. Wings usually (not always) fully developed; form normal, head not very large (p. 541) ..... *Platycoelus*

— Wings atrophied; head very large (p. 538) ..... *Paraloma*

Genus MORION Latreille

Latreille 1810, Considérations Général ..... Insectes, p. 159.

Sloane 1904, Proc. Linn. Soc. New South Wales **29**, pp. 530–534 (Australian species).

Csiki 1929, Coleop. Cat., Carabidae, Harpalinae **3**, p. 479 (see for additional references).

Andrewes 1946, Proc. R. Ent. London (B) **15**, p. 86 (characters of Oriental species).

Van Emden 1953, Proc. Hawaiian Ent. Soc. **15**, pp. 51–54 (taxonomic position).

Diagnosis. See preceding key to genera. The species of *Morion* have a characteristic appearance: parallel sided, big-headed with prominent genae, with rather short antennae and legs, and plain black (or brown) in color. Males have anterior tarsi scarcely dilated but with segments 2 and 3 (and sometimes 1) inconspicuously biseriately squamulose; both sexes have 1 seta each side apex last ventral segment.

Description. None needed here.

Genotype. Harpalus monilicornis Latreille, of warm temperate and tropical America.

Generic distribution. The warmer parts of the world.

Notes. The Oriental species of *Morion* are notoriously difficult to distinguish (Andrewes). A distinct group of the genus occurs in Australia, characterized by presence of extra setae on the prothoracic margins, and including such well marked species as *crassipes* Sloane (very large, with middle tibiae arcuate and hind tarsi wide) and *pachysomus* Chaudoir (with modified, dentate clypeus), but this group is apparently not represented in New Guinea. *M. longipenne* Putzeys does occur in Australia as well as New Guinea, but it belongs to the Oriental rather than the Australian group of the genus; it has probably reached Australia recently via New Guinea. All the species of *Morion* that I have collected are found under the bark of dead trees and logs and in rotten wood. Most of them, including the New Guinean species, are winged. Their chances of dispersal on drifting logs or through the air are therefore probably good. This probably accounts for the almost world-wide distribution of the genus, for the striking similarity of species in different regions, and for the occurrence of the genus on certain remote islands including Christmas Island in the Indian Ocean.

Key to Species of Morion of New Guinea

1. Humeri almost always rather strongly toothed, the teeth reaching laterally to or beyond outer edges of bases of 7th intervals; form a little more convex; prothoracic lateral margins a little wider; pronotum with a distinct (but not sharply defined) transverse subbasal impression not more than 1/10 of prothoracic length from base (p. 502) ..... *humeratum*

— Humeri not strongly toothed; form a little more depressed; lateral margins of prothorax a little narrower; pronotum usually without subbasal transverse impression as described above (p. 503) . . *longipenne*

Morion humeratum Chaudoir

Chaudoir 1880, Bull. Soc. Nat. Moscou **55**, Part 1, No. 2, pp. 335, 352.

Description. None needed here. See key, above. Proportions: head .89 and .83 width prothorax; prothoracic width/length 1.45 and 1.37, base/apex .87 and .95, base/head .86 and .97; width elytra/prothorax 1.11 and 1.15. *Measurements:* length 11.5-16.5; width 3.5-5.2 mm.

Types. From New Guinea (presumably **Papua**), near the Fly R. and "Katan" (?Katau) (D'Albertis). There were a number of specimens in the original series and some have probably been distributed. No single type was designated and its selection should be left to the next reviser; it would be wise to select it from specimens retained by Chaudoir and now presumably in the Oberthür Collection, Paris Mus.

Occurrence in New Guinea. **Papua**: 3, Dobodura, Mar.-July 1944 (Darlington); 1, Karema, Brown R., Mar. 8-11, 1955 (E. O. Wilson, M.C.Z.), taken in lowland rain forest; 1, Brown R., May 25, 1956 (E. J. Ford, Jr., Bishop Mus.). **N-E. N. G.**: 6, Sattelberg, Huon Gulf, 1899 (Biró, Hungarian National Mus.); 1, Stephansort, Astrolabe Bay, 1900 (Biró Hungarian National Mus.); 2, Bulolo, 730 and 1,000 m. (*c.* 2400 and 3250 ft.), Aug. 18 and 20, 1956 (E. J. Ford, Jr., Bishop Mus.); 2, Wum, Upper Jimmi Valley, 840 m. (*c.* 2730 ft.), July 17, 1955 (J. L. Gressitt, Bishop Mus.); 1, Sepalakambang, Salawaket Range, 1920 m. (*c.* 6250 ft.), Sept. 12, 1956 (E. J. Ford, Jr., Bishop Mus.); 1, Boana Mission, Huon Peninsula, 900 m. (*c.* 2925 ft.), Sept. 4-5, 1956 (E. J. Ford, Jr., Bishop Mus.). **Neth. N. G.**: 2, Humboldt Bay district, 1937 (W. Stüber, British Mus.); 2, Maffin Bay, Aug. 1944 (Darlington); 2, same locality, Aug. and Sept. 1944 (E. S. Ross, California Acad.); 1, Bomberi, Vogelkop, 700-900 m. (*c.* 2275-2925 ft.), June 9, 1959 (J. L. Gressitt, Bishop Mus.).

Measured specimens. A large ♂ and a small (and relatively small headed) ♀ from Dobodura.

Notes. This species occurs also on Bougainville Is., **Solomons** (B. D. Valentine, received from G. E. Ball) but is unknown elsewhere. My Dobodura specimens were taken in rotting logs rather than under bark.

Morion longipenne Putzeys

Putzeys 1875, Ann. Mus. Civ. Genova (Genoa) **7**, p. 727.
Chaudoir 1880, Bull. Soc. Nat. Moscou **55**, Part 1, No. 2, pp. 333, 337.
Sloane 1904, Proc. Linn. Soc. New South Wales **29**, pp. 530, 531.
—— 1907, Deutsche Ent. Zeits. **1907**, p. 470.
Maindron 1908, Nova Guinea **5**, p. 295.
Sloane 1920, Proc. Linn. Soc. New South Wales **45**, p. 321.
Andrewes 1930, Cat. Indian Carabidae, p. 221.
?d'albertisi Chaudoir 1880, Bull. Soc. Nat. Moscou **55**, Part 1, No. 2, pp. 333, 336.
?stolidum Chaudoir 1880, Bull. Soc. Nat. Moscou **55**, Part 1, No. 2, pp. 333, 336.
Andrewes 1933, Mem. Mus. R. Hist. Nat. Belgique, hors ser., **4** (4), p. 10.

Description. An "ordinary" *Morion,* very similar to the Oriental species; see key above and notes below. Proportions: head .88 and .80 width prothorax; prothoracic width/length 1.44 and 1.39, base/apex .89 and .92, base/head .89 and .96; width elytra/prothorax 1.07 and 1.15. *Measurements:* length 11.5-17.0; width 3.4-5.0 mm.

Types. Of *longipenne*, from **New Guinea** (Andai, Hatam, and Sorong, collected by Beccari and D'Albertis) and **Aru Is.** (Beccari); Putzeys did not designate a single type, but Andrewes considered the type to be in the Genoa Civic Mus. Of *d'albertisi*, from Katau and Fly R., and of *stolidum*, from Fly R. and Hatam, **New Guinea**; Chaudoir had several specimens of each species. Lectotypes should be designated for all these species by the next reviser.

Occurrence in New Guinea. Specimens are before me from **Papua**: 14, Dobodura, Mar.-July 1944 (Darlington); 4 Oro Bay, Dec. 1943-Jan. 1944 (Darlington); 1, Milne Bay, July (Wind, M.C.Z.); 5, Kokoda, June, July, Aug. 1933 (Cheesman); 2, Bisianumu near Sogeri, 500 m. (about 1625 ft.), Mar. 15-20, 1955 (E. O. Wilson, M.C.Z.), in rain forest; 5, Kiunga, Fly R., July 4-8 and 11-14, Aug. 8-10, and Oct. 26-28, 1957 (W. W. Brandt, Bishop Mus.); 1, Bisianumu, E. of Port Moresby, 500 m. (*c.* 1625 ft.), Sept. 24, 1955 (J. L. Gressitt, Bishop Mus.); 1, middle Fly R., 250-300 mi. up, July 1928 (Pemberton, Hawaiian Sugar Planters' Association); 1, Yule Is. (Hungarian National Mus.). **N-E. N. G.**: 4, Morobe District (2 specifically from Mt. Misim) (Stevens, M.C.Z.); 1, Koitakinumu, Central Division, April 1918 (J. T. Zimmer, Chicago Mus.); 1, Finschhafen, May 1944 (E. S. Ross, California Acad.); 6, Erima,

Astrolabe Bay, 1897 (Biró, Hungarian National Mus.); 4, Stephansort, Astrolabe Bay, 1897 (Biró, Hungarian National Mus.); 1, Simbang, Huon Gulf, 1898 (Biró, Hungarian National Mus.); 1, Sattelberg, Huon Gulf, 1899 (Biró, Hungarian National Mus.); 1, same locality (bought from Staudinger and Bang-Haas); 3, Bulolo, 1020 m. (*c.* 3300 ft.), Aug. 13, 17, 30, 1956 (E. J. Ford Jr., Bishop Mus.); 3, Wum 840 m. (*c.* 2730 ft.), July 16, 17, 1955 (J. L. Gressitt, Bishop Mus.); 1, Busu R., E. of Lae, 100 m. (*c.* 325 ft.), Sept. 14, 1955 (J. L. Gressitt, Bishop Mus.); 1, same locality, 12 km., Sept. 21, 1956 (E. J. Ford Jr., Bishop Mus.); 1, Tsenga, Upper Jimmi Valley, 1200 m. (*c.* 3900 ft.), July 15, 1955 (J. L. Gressitt, Bishop Mus.). **Neth. N. G.**: 15, Hollandia, Jan. and May 1945 (Malkin, U.S.N.M.); 1, same locality, July 1938 (Toxopeus, Leiden Mus.); 7, Waris, S. of Hollandia, 450-500 m. (*c.* 1450-1625 ft.), Aug. 1-2, 1-7, 8-15, 24-31, 1959 (T. C. Maa, Bishop Mus.); 1, Cyclops Mts., Hollandia area W. of Sentani, 50-100 m. (*c.* 150-325 ft.), June 22-24, 1959 (Gressitt and Maa, Bishop Mus.) taken in light trap; 4, Humboldt Bay District, 1937 (W. Stüber, British Mus.); 3, Maffin Bay, Aug. 1944 (Darlington); 4, same locality, July, Aug., Sept. 1944 (E. S. Ross, California Acad.); 1, Wasian (Vogelkop), Sept. 1939 (Wind, M.C.Z.). Also before me are 6 specimens from New Guinea from localities that I cannot find or without exact localities. The species is evidently common over the whole of New Guinea at low and moderate altitudes.

Measured specimens. A pair (♂ ♀) from Dobodura.

Notes. The specimens listed above vary considerably in size, proportions, and some other characters, but I cannot divide them into more than one recognizable species.

Just how *longipenne* is related to the common Oriental species I am not prepared to say. It is very similar to both *orientale* and *cucujoides*, which Andrewes considered the two principal species of *Morion* in the Orient and western Malay Archipelago. One character that vaguely separates *longipenne* from the Oriental forms is the sinuation of the outer edge of the lateral lobes of the mentum, but the sinuation varies from strong to almost absent in specimens from New Guinea, and it is present in some Oriental specimens.

Most specimens of *longipenne* that I have seen have the pronotum rather strongly margined anteriorly, from the angles ⅓ or ½ way in toward middle. However, of the specimens listed above, 2 from Morobe District (including 1 from Mt. Misim)

and Biró's specimen from Sattelberg have the anterior margin of pronotum almost obsolete, visible only near the angles, and these specimens also have eyes slightly larger than usual in *longipenne* and 7th elytral intervals scarcely elevated at base (degree of elevation varies in *longipenne*). These specimens may represent *d'albertisi* Chaudoir; but I am unable to decide whether the differences are really specific or just individual. The specimens in question are rather large, but equally large specimens with characters of *longipenne* occurred with the variants in the Morobe District. The variants have the outer edges of the mentum lobes sinuate, as in *longipenne*.

Whether *longipenne* occurs west of New Guinea remains to be seen, and in fact can be decided only when the synonymy of related forms is decided. Andrewes identified specimens as *cucujoides* from as far east as Celebes, Buru, and the Aru Is.; as *orientale*, east to Celebes; and I have specimens that seem to be *orientale* from Halmahera and Morotai Is. in the Moluccas. *M. longipenne* extends to tropical North Queensland, **Australia**.

Genus Mecyclothorax Sharp

Sharp 1903, Fauna Hawaiiensis **3**, p. 243.

Csiki 1929, Coleop. Cat., Carabidae, Harpalinae **3**, p. 487 (see for additional references).

Britton 1948, Occasional Papers Bishop Mus. **19**, No. 4, pp. 107–166 (see for generic synonymy, and Hawaiian species).

Louwerens 1949, Verhandlungen naturforschenden Gesellschaft Basel **64**, p. 320 (key to Javan species).

Diagnosis. A very small pterostichine, unique (among the Pterostichini of New Guinea) in presence of a bristle in the scrobe (external sulcus) of each mandible.

Description. None needed here.

Genotype. Apparently not yet selected; must be one of the Hawaiian species included by Sharp (1903).

Generic distribution (*cf.* Britton 1948, p. 107). Australia (15 or more species, rather diverse in structure); St. Paul and Amsterdam Is. in the southern Indian Ocean (1 species, closely related to the ubiquitous *ambiguus* of southern Australia); New Zealand (1 species, at most a subspecies of *ambiguus*); New Guinea (1 high-mountain species, described below); Java (5 mountain-living species); New Caledonia (1 species); Hawaiian Is. (85 species, apparently evolved from 1 original stock); and Tahiti (4 species). Most of the Australian species occur in the

south-temperate part of the continent, but one (*?cordicollis* Sl.) extends north to the Atherton Tableland in tropical North Queensland.

Notes. The Australian species of *Mecyclothorax* are ground-living mesophiles which occur in leaf-debris etc. in both humid and dry country, usually not specifically by open water. Some have fully developed, others atrophied wings.

Mecyclothorax toxopei n. sp.

Description. Form (fig. 50) about average for genus, rather strongly convex; black, appendages dark brown; microsculpture indistinct on front, lightly impressed on neck and pronotum (somewhat transverse on latter), more deeply impressed (and almost isodiametric) on elytra. *Head* .76 width prothorax; eyes moderately prominent, genae behind them oblique, slightly arcuate; antennae with middle segments about 2X long as wide, pubescent from 4th segment; mandibles short, curved, each with a seta in scrobe; front convex, with short, broad, irregular impressions; 2 supraocular setae over each eye; mentum with strong rounded tooth. *Prothorax* rounded-subcordate; width/length 1.29; base/apex .98; base/head .86; sides arcuate through much of length, strongly converging posteriorly, not sinuate before base except slightly and obtusely notched just before angles; apex subtruncate, with angles close to neck and not advanced; base subtruncate, slightly sinuate each side; posterior angles broadly obtuse; lateral margins narrow anteriorly, broader toward base, each with usual 2 setae about $\frac{2}{3}$ from apex and just before basal angle; disc convex, with rather vague transverse anterior impression, fine middle line, and vague posterior transverse impression; baso-lateral impressions moderate, not sharply limited. *Elytra* quadrate-oval, subparallel at middle; width elytra/prothorax 1.50; humeri rather prominent but broadly rounded; subapical sinuations slight; anterior margin entire, faintly (very obtusely) angulate near humeri; striation almost entire except nearly obliterated externally and apically, striae moderately impressed on disc, slightly irregular but not distinctly punctate; intervals slightly convex on disc, 3rd 5- or 6-punctate (asymmetrical), 5th 3- or 4-punctate. *Inner wings* evidently reduced, although I have not attempted to raise an elytron of the single known specimen. *Lower surface* and *legs* not examined; they cannot be seen without remounting the specimen, and it seems unnecessary to risk it. *Secondary sexual*

characters not visible without remounting. *Measurements:* length 4.7; width 2.0 mm.

Type. Holotype ♂ (Leiden Mus.) from Wilhaminatop, Scree Valley Camp, 4200 m. (about 13,650 ft.), **Neth. N. G.**, Sept. 23, 1938 (L. J. Toxopeus). The label bears an additional note that I cannot decipher and that may indicate habitat.

Occurrence in New Guinea. Known only from the type.

Measured specimen. The type.

Notes. In Louwerens' key to the Javan species of *Mecyclothorax* (1949, p. 320), this runs to *lissus* Andrewes, but comparison shows that the new species differs from *lissus* in being duller, with microsculpture visible on pronotum as well as elytra (only on elytra in *lissus*), and in having extra dorsal punctures on 3rd and 5th elytral intervals. There are other small differences, not worth listing here. As compared with *cordicollis* Sloane, which is the most similar Australian species that I know, the new one differs in details of form, absence of punctures on base of pronotum, less punctate elytral striae, presence of additional dorsal punctures on 3rd and 5th intervals, much duller surface, etc. The occurrence of this genus in New Guinea was to be expected; additional species probably exist on other mountains there. And species of the genus are to be expected on Celebes, Borneo, and other islands of the archipelago with high mountains, although heretofore they have been found only on Java.

Genus BRACHIDIUS Chaudoir

Chaudoir 1852, Bull. Soc. Nat. Moscou **25**, Part 1, No. 1, p. 78.

Csiki 1929, Coleop. Cat., Carabidae, Harpalinae **3**, p. 493 (see for additional references).

Diagnosis. See key to genera of Pterostichini. The single species of this genus is a rather small, very stout, compact, winged, black or brownish carabid distinguishable from all (superficially) similar species in New Guinea by position of the anterior-lateral prothoracic setae, almost on the anterior angles of prothorax.

Description. None needed here.

Genotype. B. crassicornis Chaudoir (see below).

Generic distribution. **Burma** etc. east and south to the **Philippines**, **New Guinea**, **New Britain**, and the **Solomons** (Bougainville Is., 1 in California Acad.), but not Australia.

Notes. If the current classification (Csiki) is correct, the only close relative of this genus is *Cratocerus* of Central and South America.

Brachidius crassicornis Chaudoir

Chaudoir 1852, Bull. Soc. Nat. Moscou **25**, Part 1, No. 1, p. 80.

Csiki 1929, Coleop. Cat., Carabidae, Harpalinae **3**, p. 493 (see for synonymy and additional references).

Andrewes 1930, Cat. Indian Carabidae, p. 48.

Description. See diagnosis of genus, of which this is the only species. Proportions: head .60 and .62 width prothorax; prothoracic width/length 1.70 and 1.72, base/apex 1.31 and 1.28, base/head 1.51 and 1.49; width elytra/prothorax 1.20 and 1.22. *Measurements* (Dobodura series): length 6.4-8.1; width 2.8-3.5 mm. (Chimbu Valley specimen: 9.5 x 4.1 mm.).

Type. From **Timor**, now in Oberthür collection, Paris Mus.

Occurrence in New Guinea. **Papua**: 112, Dobodura, Mar.-July 1944 (Darlington); 1, Kokoda, 1200 ft., Aug. 1933 (Cheesman). **N-E. N. G.**: 1, Erima, Astrolabe Bay, 1896 (Biró, Hungarian National Mus.); 1, Chimbu Valley, Bismarck Range, 5000-7500 ft., Oct. 1944 (Darlington); 1, Torricelli Mts., Mokai Village, 750 m. (*c.* 2450 ft.), Jan. 1-23, 1959 (W. W. Brandt, Bishop Mus.); 8, Aitape, Aug. 1944 (Darlington). **Neth. N. G.**: 2, Hollandia, July-Sept. 1944 (Darlington); 2, Maffin Bay, Aug. 1944 (Darlington); 1, same locality, Sept. 1944 (E. S. Ross, California Acad.); 1, Cyclops Mts., Sabron, Camp 2, 2000 ft., July 1936 (Cheesman); 2, Geelvink Bay, 1878 (Raffray and Maindron, Paris Mus.).

Notes. The range of the species outside New Guinea is, of course, the same as that of the genus. The single specimen from Chimbu Valley is exceptionally large, over 9 mm. long; the largest specimens from Dobodura are about 8 mm. This species was very common in rotting logs at Dobodura.

Genus Caelostomus Macleay

Macleay 1825, Annulosa Javanica, p. 23.

Csiki 1929, Coleop. Cat., Carabidae, Harpalinae **3**, p. 496 (see for synonymy and additional references).

Straneo 1938, Ann. Mus. Civ. Genova (Genoa) **60**, pp. 5–100 (the Oriental including New Guinean species).

Diagnosis. Small, compact, convex, winged (in New Guinea) Pterostichini unique (among New Guinean pterostichines) in having elytron with puncture at base 3rd stria.

Description. None needed here.

Genotype. C. picipes Macleay.

Generic distribution. Africa and tropical Asia, north to Japan

and east and south to the Philippines, New Guinea etc., and tropical Australia.

Notes. I am indebted to Prof. Straneo for identification of selected specimens of this genus. Most species of the genus that I have collected were under bark or in rotten logs. However, *C. picipes* lives at least partly in a different habitat, in rotting or fermenting vegetation. It is sometimes very common, and is likely to be carried with vegetable material by man.

Key to the Species of Caelostomus of New Guinea

1. Prothorax with anterior-lateral setae present 2
— Prothorax without anterior-lateral setae (p. 509) ..... *novae-guineae*
2. Apex of elytra pale; sides of prothorax broadly rounded almost to base; lower surface closely punctate (p. 510) ..... *picipes*
— Apices of elytra not pale; sides of prothorax less rounded posteriorly, usually sinuate; lower surface less densely punctate 3
3. Metasternum (outer corners of it) more or less punctate (p. 510) *albertisi*
— Metasternum not punctate 4
4. Sides of prothorax variably but usually weakly sinuate before base; ratio base prothorax/head *c.* 1.39 and 1.38 (p. 511) ..... *subsinuatus*
— Sides of prothorax strongly sinuate before base, basal angles rectangular; ratio base prothorax/head 1.19 and 1.18 (p. 512) ..... *straneoi*

Caelostomus novae-guineae Straneo

Straneo 1938, Ann. Mus. Civ. Genova (Genoa) **60**, p. 48, fig. 33.

Description. A moderately large, black or brownish black, shining species with ferrugineous appendages, unique among New Guinea *Caelostomus* in lacking anterior-lateral prothoracic setae. Proportions: head .66 and .63 width prothorax; prothoracic width/length 1.30 and 1.28, base/apex 1.40 and 1.35; base/head 1.45 and 1.38; width elytra/prothorax 1.43 and 1.40. *Measurements:* length 5.3-7.0; width 2.3-2.9 mm.

Type. One specimen, sex not given, from Moroka, southeast New Guinea (presumably **Papua**), 1300 m. (about 4225 ft.), collected by Loria, now in Genoa Civic Mus.

Occurrence in New Guinea. **Papua**: the type. **N-E. N. G.**: 1, Nadzab, July 1944 (Darlington); 1, lower Busu R., Huon Peninsula, April 12, 1955 (E. O. Wilson, M.C.Z.), taken in lowland rain forest; 3, Wamuki, Gemeheng, and Joangeng (1 from each), Mongi Watershed, Huon Peninsula, 300 to 800 m. (*c.* 975-2600 ft.), various dates in April 1955 (E. O. Wilson,

M.C.Z.); 11, Sattelberg, Huon Peninsula 1899 (Biró, Hungarian National Mus.).

Measured specimens. Small ♂ from lower Busu R., large ♀ from Gemeheng.

Notes. The records suggest that this species occurs only or chiefly toward the eastern end of New Guinea.

Caelostomus picipes Macleay

Macleay 1833, Annulosa Javanica, p. 123.

Straneo 1938, Ann. Mus. Civ. Genova (Genoa) **60**, p. 64 (see for synonymy and additional references).

Description. A brownish black *Caelostomus* characterized in the preceding key. It is immediately recognizable by the pale elytral apices. Proportions: head .69 and .66 width prothorax; prothoracic width/length 1.40 and 1.42, base/apex 1.26 and 1.28, base/head 1.26 and 1.31; width prothorax/elytra 1.49 and 1.46. *Measurements:* length 5.3-6.2; width 2.4-2.7 mm.

Type. From **Java**, now in British Mus.

Occurrence in New Guinea. **Papua**: 4, Dobodura, Mar.-July 1944 (Darlington); 2, Milne Bay, Dec. 1933 (Darlington); 3, Kokoda, 1300 ft., Oct., Sept. 1933 (Cheesman). **N-E. N. G.**: 2, Busu R., E. of Lae, 100 m. (*c.* 325 ft.), Sept. 13 and 15, 1955 (J. L. Gressitt Bishop Mus.); 7, Aitape, Aug. 1944 (Darlington); 1, Rawlinson Range (bought from Staudinger and Bang-Haas). **Neth. N. G.**: 1, Hollandia, Apr. 1945 (Malkin, U.S.N.M.); 1, same locality, Nov. 21, 1944 (Hoogstraal, M.C.Z.); 2, same locality, Dec. 1944 and Jan. 1945 (W. T. Nailon, borrowed from Prof. F. A. Fenton); 1, Cyclops Mts., Sabron, Camp 1, 1200 ft., May 1936 (Cheesman).

Measured specimens. A pair (♂ ♀) from Dobodura.

Notes. C. picipes is widely distributed in the **Oriental Region**, extending north to **Japan** (as subspecies *japonicus*) and east and south through the **Malay Archipelago** to **New Guinea** etc. and tropical **Australia**. Its habits are mentioned in notes under the genus.

Caelostomus albertisi Straneo

Straneo 1938, Ann. Mus. Civ. Genova (Genoa) **60**, p. 73.

Description. An ordinary looking species of the genus, distinguished from others in New Guinea by characters given in the preceding key. Proportions: head .70 and .68 width prothorax; prothoracic width/length 1.23 and 1.26, base/apex (not

calculated) and 1.34; base/head 1.26 and 1.30; width elytra/prothorax 1.49 and 1.40. *Measurements:* length 5.2-7.0; width 2.1-2.7 mm.

Types. Described from 3 specimens from Katau, (**Papua**), collected by D'Albertis. The holotype is in Genoa Civic Mus.

Occurrence in New Guinea. **Papua**: 1, Dobodura, Mar.-July 1944 (Darlington); 1, Palmer R. at Black R., June 7-14, 1936 (Archbold Exped., A.M.N.H.); 1, Kiunga, Fly R., Oct. 1-7, 1957 (W. W. Brandt, Bishop Mus.); 1, Bulolo, 1020 m. (*c.* 3300 ft.), Aug. 25, 1956 (E. J. Ford Jr., Bishop Mus.); 1, Laloki, Feb. 3, 1910 (F. Muir, Hawaiian Sugar Planters' Association). **N-E. N. G.**: 2, Aitape, Aug. 1944 (Darlington). **Neth. N. G.**: 3, Hollandia, Apr. 1945 (Malkin, U.S.N.M.); 2, Cyclops Mts., Sabron, Camp 1, 1200 ft., May 15, 1936 (Cheesman); 1, Fac Fac, June 1939 (Wind. M.C.Z.).

Measured specimens. A ♂ from Aitape and large ♀ from Dobodura.

Notes. This species varies considerably in size and somewhat in other characters, but I cannot divide it satisfactorily. The punctures of the outer corners of the metasternum are usually obvious but sometimes almost lacking, and in that case specimens must be identified from the combination of other characters. The species occurs also on the Cape York Peninsula of **Australia**.

Caelostomus subsinuatus (Chaudoir)

Chaudoir 1883, in Oberthür, Coleop. Novitates **1**, p. 38 (*Drimostoma*).
Straneo 1938, Ann. Mus. Civ. Genova (Genoa) **60**, p. 81.
rectangulus Andrewes 1930 in part (not Chaudoir), Cat. Indian Carabidae, p. 57 (New Guinean record is based on *subsinuatus*, *t.* Straneo 1938).
loriai Straneo 1938, Ann. Mus. Civ. Genova (Genoa) **60**, p. 76.

Description. Another "ordinary" *Caelostomus*, distinguished by impunctate metasternum and other characters given in preceding key. Proportions: head .63 and .64 width prothorax; prothoracic width/length 1.29 and 1.37, base/apex 1.30 and 1.34, base/head 1.39 and 1.38; width elytra/prothorax 1.37 and 1.36. *Measurements:* length *c.* 5.1-6.9; width 2.1-2.7 mm.

Types. Of *subsinuatus*, from Fly R., (presumably **Papua**); of *loriai*, from "S. E. Paumomu Riv. (Loria): Papuasia, Mafulu (L. E. Cheesman)." I have not found either locality. The holotype, presumably from Paumomu R., is in Genoa Civic Mus.

Measured specimens. A pair (♂ ♀) from Dobodura.

Occurrence in New Guinea. **Papua**: 20, Dobodura, Mar.-July

1944 (Darlington); 3, Oro Bay, Dec. 1943-Jan. 1944 (Darlington); 1, Bisianumu nr. Sogeri. 500 m. (*c.* 1625 ft.), Mar. 15-20, 1955 (E. O. Wilson, M.C.Z.) taken in rain forest; 1, Milne Bay, Dec. 1943 (Darlington); 1, Normanby Is., Wakaiuna, Sewa Bay, Nov. 11-20, 1956 (W. W. Brandt, Bishop Mus.). **N-E. N. G.**: 3, Nadzab, July 1944 (Darlington); 1, Finschhafen, Apr. 21, 1944 (E. S. Ross, California Acad.); 1, Erima, Astrolabe Bay, 1897 (Biró, Hungarian National Mus.); 12, Aitape, Aug. 1944 (Darlington); 1, Bulolo, 1000 m. (*c.* 3250 ft.), Aug. 21, 1956 (E. J. Ford Jr., Bishop Mus.); 1, Tsenga, upper Jimmi Valley, 1200 m. (*c.* 3900 ft.), July 14, 1955 (J. L. Gressitt, Bishop Mus.). **Neth. N. G.**: 1, Maffin Bay, Aug. 1944 (Darlington); 2, same locality, July and Sept. 1944 (E. S. Ross, California Acad.); 1, Ifar, 300-600 m. (*c.* 975-1950 ft.), June 20, 1959 (J. L. Gressitt, Bishop Mus.); 1, Biak Is., Kampong Landbouw, 50-100 m. (*c.* 150-325 ft.), May 28, 1959 (J. L. Gressitt, Bishop Mus.); 1, Bomberi, Vogelkop, 700-900 m. (*c.* 2275-2925 ft.), June 8, 1959 (J. L. Gressitt, Bishop Mus.); 1, Waigeu Is., Camp 1, Mt. Nok, 2500 ft., May 1938 (Cheesman).

Notes. Straneo (1938, p. 21, in key) distinguishes *loriai* from *subsinuatus* by size and perhaps by form of prothorax, although the latter character is not clear. However, the size difference is not great: according to Straneo, *loriai* is 5.8 mm. long, *subsinuatus* 5.4. My series covers both these measurements and does not seem to divide into two species of different sizes, and I cannot find other characters to divide the series. One of my specimens of *subsinuatus* has been identified by Straneo.

The specimen from Bomberi (Vogelkop) is near maximum size for the species, wider (prothoracic width/length 1.50), and with elytral striae less impressed than usual. It may represent a separate species, but I do not want to describe it from the single, somewhat damaged specimen. It does not answer the description of *loriai* as compared with *subsinuatus*.

Caelostomus straneoi n. sp.

Description. Form (fig. 49) about average in genus, moderately convex; dark brown, appendages not much paler; microsculpture faint, isodiametric on front, somewhat transverse on pronotum, very faint but transverse on elytral intervals. *Head* .67 and .66 width prothorax; eyes moderately prominent, enclosed behind by short genae slightly arcuate in profile and about ¼ as long as eyes; antennae with middle segments slightly

longer than wide (not including pubescence); frontal impressions fine, sinuous, strongly converging anteriorly, ending posteriorly about mid-eye level; mentum with strong, bluntly rounded tooth. *Prothorax* subcordate, less narrowed anteriorly and more narrowed posteriorly than usual; width/length 1.39 and 1.38; base/apex 1.17 and 1.15; base/head 1.19 and 1.18; sides rather broadly and irregularly arcuate in about anterior ¾, broadly and rather strongly sinuate before base; apex subtruncate or very broadly emarginate, with anterior angles rounded, not advanced; base subtruncate; basal angles well defined, almost right; lateral margins narrow, each with seta about ⅖ from apex and at basal angle; disc rather weakly convex; anterior transverse impression vague, middle line fine except broader and deeper in basal ⅓; baso-lateral impressions sublinear, deep, curving slightly inward anteriorly, less than ½ length of prothorax. *Elytra* subquadrate, much wider than prothorax (E/P 1.42 and 1.43); basal margin entire or nearly so (but very fine inside base 3rd stria), obtusely subangulate at humeri; striae entire, moderately impressed, punctulate. *Inner wings* fully developed. *Lower surface* only partly and sparsely punctate: proepisterna impunctate or nearly so; metepisterna punctate, but not wings of metasternum; ventral segments rather sparsely punctate at sides, not margined. *Legs* without obvious unusual characters. *Secondary sexual characters* normal for genus: ♂ with front tarsi not modified; ♂ with 1, ♀ 2 setae each side last ventral segment. *Measurements:* length 4.8-5.0; width 2.0-2.1 mm.

Types. Holotype ♂ (M.C.Z. No. 30,216) and one ♀ paratype both from Dobodura, Papua, Mar.-July 1944 (Darlington).

Measured specimens. The types.

Notes. A specimen of this species was submitted to Prof. Straneo some years ago and returned with the note "*prope subsinuatus.*"

Genus COSMODISCUS Sloane

Sloane 1907, Proc. Linn. Soc. New South Wales **32**, p. 371.
Andrewes 1920, Ann. Mag. Nat. Hist. (9) **5**, p. 445.

Diagnosis. Small, very broad pterostichines with short, strongly curved mandibles, abruptly prominent eyes, prothoracic baso-lateral foveae single and linear, elytra without scutellar striae, with basal puncture at base 2nd stria, and 3rd interval impunctate.

Description. None required here. See references.

Genotype. C. rubripictus Sloane of Australia etc.

Generic distribution. Southeast Asia, Japan, Formosa, Sumatra, Java, Bali, Mindanao, vicinity of Celebes, New Guinea, Kei and Aru Is., and tropical northeastern Australia; and probably other islands between Asia and Australia.

Notes. The two species of this genus that I have collected were found among dead leaves and debris on the ground in rain forest.

Key to Species of Cosmodiscus of New Guinea

1. Black with red elytral marks; slightly broader, prothorax more narrowed anteriorly (base/apex 1.46 and 1.50) (p. 514) *rubripictus*
— Brown, without markings; slightly narrower, prothorax relatively less narrowed in front (base/apex 1.31 and 1.28) (p. 515) *brunneus*

Cosmodiscus rubripictus Sloane

Sloane 1907, Proc. Linn. Soc. New South Wales **32**, p. 371.
Sloane 1920, Proc. Linn. Soc. New South Wales **45**, p. 322.
Andrewes 1920, Ann. Mag. Nat. Hist. (9) **5**, pp. 445, 447.

Description. A rather shining black *Cosmodiscus* with somewhat variable red marks on elytra including humeral patches and an irregular fascia or separated spots near top of declivity. Proportions: head .55 and .54 width prothorax; prothoracic width/length 1.69 and 1.71, base/apex 1.46 and 1.50, base/-head 1.62 and 1.66; width elytra/prothorax 1.17 and 1.18. *Measurements* (of specimens from New Guinea): length 5.8-7.0; width 2.6-3.1 mm. (The length of the type, from Australia, given by Sloane as 7.7 mm.)

Type. From Kuranda, North Queensland, **Australia**, collected by Dodd, in Sloane collection, Canberra.

Occurrence in New Guinea. **Papua**: 2, ♂ ♀, Dobodura, Mar.-July 1944 (Darlington).

Measured specimens. The pair from Dobodura.

Notes. Sloane (1920) and Andrewes say that specimens from the **Aru** and **Kei Is.** are smaller than the type, as are those from
68 MCZ Darlington 8521 MM8 Nov2
New Guinea. I have not made a direct comparison, but, except for size, my specimens answer the description well.

I have examined (at British Mus., in 1947) the type of *C. rufolimbatus* Jedlicka (1936, *Acta Soc. Ent. Czechoslovakia* **33**,

p. 103) from Mindanao and a paratype of *C. louwerensi* Straneo (1940, *Boll. Zool. Unione Italiana* **11**, p. 215), from Saleier Is. S. of Celebes. Both seem to me to be forms of *rubripictus*, but I do not care to synonymize them without seeing more material and establishing the limits of variation in different localities.

Cosmodiscus brunneus n. sp.

Description. Form (fig. 51) about average for genus, slightly narrower and more subquadrate (less oval) than *rubripictus;* brown, head and pronotum darker, elytra not spotted, appendages brown; rather shining, reticulate microsculpture indistinct on front, faint and transverse on disc of pronotum, more distinct and transverse on elytra. *Head* .62 and .64 width prothorax; eyes abruptly prominent as usual in genus; mandibles strongly curved, striolate; antennae rather short (as usual), middle segments (not including pubescence) slightly longer than wide; front moderately convex; clypeal suture slighty impressed; frontal foveae short, sublinear, diverging posteriorly; front faintly and finely punctulate (seen at 100X); mentum with strong, acute tooth. *Prothorax* transverse, more narrowed in front than behind but less so than in *rubripictus;* width/length 1.59 and 1.55; base/apex 1.31 and 1.28; base/head 1.40 and 1.39; base faintly 3-sinuate, faintly lobed behind each basal fovea; apex broadly emarginate but anterior angles not otherwise advanced; sides rather weakly arcuate, nearly straight (and converging) posteriorly; apex and sides margined, base not; each side margin with usual 2 setae about $\frac{2}{3}$ from apex and at basal angle; basal angles obtuse but distinct, slightly blunted; anterior transverse impression of disc slight and short, middle line lightly impressed but reaching base or nearly so; basolateral impressions linear, about $\frac{1}{3}$ long as pronotum, slightly nearer middle than sides; surface of disc finely punctulate (more distintly so than front). *Elytra* subquadrate, about $\frac{1}{4}$ wider than prothorax (E/P 1.22 and 1.28); humeri rounded-prominent, not dentate; sides subparallel for much of length, then rounded to apices, with slight subapical sinuations; margins entire at base, rounded at humeri; striae entire, deeply impressed, not punctate; basal puncture at or slightly inside base 2nd stria; 3rd interval without fixed punctures. *Lower surface:* proepisterna not punctate but sides of body extensively punctate otherwise; ventral segments not margined anteriorly. *Legs* (♂)

generally similar to those of *rubripictus*. *Secondary sexual characters* (of ♂): anterior tarsi rather widely dilated, with segments approximately symmetrical and first 3 biseriately squamulose; 1 seta each side last ventral segment; ♀ unknown. *Measurements:* length 7.1-7.5; width 3.0-3.2 mm.

Types. Holotype ♂ (M.C.Z. No. 30,217) and 3 ♂ ♂ paratypes from Dobodura, **Papua**, Mar.-July 1944 (Darlington); 1 ♂ paratype, Kokoda, **Papua**, 1200 ft., Sept. 1933 (Cheesman); 1 ♂ paratype, lower Busu R., Huon Peninsula, **N-E. N. G.**, May 12, 1955 (E. O. Wilson, M.C.Z.) taken in lowland rain forest; 1 ♂ paratype, Sattelberg, **N-E. N. G.**, 1899 (Biró, Hungarian National Mus.).

Measured specimens. The holotype and 1 paratype from Dobodura.

Notes. In Andrewes' key (1920, see reference under genus) to the species of *Cosmodiscus,* this would run to couplet 2 (3), but differs from *platynotus* Bates in having humeri not dentate (and in many other details) and from *rubripictus* as indicated in the key and description above. It is probably closer to *umeralis* Andrewes (1937, *Bull. Ann. Soc. Ent. Belgique* **77**, p. 38) of Bali, but, as compared with Andrewes' type, the present new species is more slender, with prothorax less narrowed anteriorly and with posterior angles not denticulate. The 2 other described species of the genus are closer to *rubripictus* and are mentioned in notes thereunder.

Genus HOMALONESIOTA Maindron

Maindron 1908, Nova Guinea **5**, p. 295.

Diagnosis. A pterostichine which at first sight looks like a very small, dull *Morion,* but with different head, more slender legs and antennae, and very different technical characters (see Andrewes, reference cited under following species).

Description. None required here. See again Andrewes.

Genotype. Homalonesiota karawari Maindron (see below).

Generic distribution. Known only from the type from New Guinea.

Notes. I have not seen this genus. It was something of a mystery to Andrewes even after he examined the specimen on which it was based. I have placed it in the key to genera (p. 499) according to characters given by Andrewes. It seems possible that it is related to *Cosmodiscus,* but, if so, it is surprising that Andrewes did not recognize the relationship.

Homalonesiota karawari Maindron

Maindron 1908, Nova Guinea **5**, p. 296.
Andrewes 1946, Proc. R. Ent. Soc. London (B) **15**, p. 85.

Description. None required here. See generic diagnosis, and Andrewes' redescription of type. Andrewes gives length as 10, width as 3 mm.

Type. A ♀ from Tawarin, **New Guinea**, June 1903. It was examined by Andrewes "in Mr. Guy Babault's collection in 1922, and [it is] therefore no doubt now in the Paris Museum."

Occurrence in New Guinea. Known only from the type.

Measured specimens. None.

Notes. See "*Notes*" under the genus. The type locality, "Tawarin" (River), is on the north coast of **Neth. N. G.** about 50 miles west of Hollandia.

Genus Abacetus Dejean

Dejean 1828, Spécies Général Coleop. **3**, p. 195.
Csiki 1929, Coleop. Cat., Carabidae, Harpalinae **3**, p. 502 (see for additional references and synonymy).
Andrewes 1942, Proc. R. Ent. Soc. London (B) **11**, pp. 21–35 (the Indian species).
Straneo 1958, South African Animal Life (Results Lund U. Expedition 1950–1951) **5**, pp. 344 ff. (see for some other recent references; subgenera).

Diagnosis. Small (4.7-6.8 mm.), winged (in New Guinea), water-loving (in New Guinea) pterostichines; antennae with segment 2 inserted in apex of segment 1 more eccentrically than usual; scutellar stria absent; elytra with 3rd interval 1-punctate; ♂ front tarsi with segments not oblique. The 2 common New Guinean species (but not the doubtful *convexiusculus*) are distinguished from all other small pterostichines on the island by possession of prothoracic stridulating files, each file composed of about 12 or more short transverse costae in a longitudinal row on the proepisternum near its inner edge anteriorly. The files are present in both sexes.

Description. None needed here.

Genotype. A. gagates Dejean of Africa.

Generic distribution. The warmer part of the Old World, north to Europe and Japan and east and south to the Philippines, New Guinea etc., and Australia.

Notes. Abacetus includes many species in Africa and southern Asia, fewer in Australia, and only 2 or 3 in New Guinea. Of the New Guinean species, one (*haplosternus*), represents a

widely distributed species (or group of closely related species) that ranges from India etc. to Australia, and another (*straneoi*) is apparently a slight local modification of the same stock. Both occur among dead leaves and in other cover in very wet places. A third, quite different species (*convexiusculus*) is doubtfully recorded from the western tip of New Guinea.

Key to Species of Abacetus of New Guinea

1. Pronotum with base coarsely punctate, and linear baso-lateral foveae joined to marginal gutters posteriorly by strongly curved impressed lines; prothoracic stridulating files absent (p. 521) *convexiusculus*
— Pronotum with base not or indistinctly punctate, with baso-lateral foveae not joined to marginal gutters as described; prothoracic stridulating files present 2
2. Sides of prothorax usually moderately or strongly (rarely weakly) sinuate before base, and relatively widely margined, the reflexed side margins at base usually nearly as wide as distance between their inner edges and the baso-lateral impressions (p. 518) *haplosternus*
— Sides of prothorax weakly or not sinuate, and with narrower margins (p. 519) ..... *straneoi*

Abacetus haplosternus Chaudoir

Chaudoir 1878, Bull. Soc. Nat. Moscou **53**, Part 2, No. 3, p. 25.
Andrewes 1942, Proc. R. Ent. Soc. London (B) **11**, p. 25 (in key).
(Pertinent references only.)

Description. A medium-sized black *Abacetus* with cordate prothorax; middle and hind tarsi not pluri-sulcate; front tibial spur not trifid; frontal furrows curving outward posteriorly toward anterior supraocular setae, not prolonged beyond mid-eye level; metepisterna long; prothorax without basal margin, linear baso-lateral foveae not joining marginal gutters at base; prothoracic margins wide; elytral striae not distinctly punctate (characters selected from Andrewes' key); and prothoracic stridulating files present. Proportions: head .64 and .66 width prothorax; prothoracic width/length 1.21 and 1.20, base/apex 1.09 and 1.12, base/head 1.10 and 1.10; width elytra/prothorax 1.33 and 1.36. *Measurements:* length *c.* 5.4-6.8; width *c.* 2.0-2.5 mm.

Type. From Bangkok, **Siam**, in Oberthür collection, Paris Mus.

Occurrence in New Guinea. **Papua**: 42, Dobodura, Mar.-July 1944 (Darlington); 9, Oro Bay, Dec. 1943-Jan. 1944 (Darlington); 2, Lake Daviumbu, Fly R., Aug. 19-30 and Sept. 11-20, 1936 (Archbold Expedition, A.M.N.H.). **N-E. N. G.**: 5, Aitape, Aug. 1944 (Darlington). **Neth. N. G.**: 142, Hollandia, July-Sept. 1944 (Darlington); 1, Maffin Bay, Aug. 1944 (Darlington); 10, Sansapor (Vogelkop), Aug. 1944 (Darlington).

Measured specimens. A pair (♂ ♀) from Dobodura.

Notes. Andrewes records *haplosternus* from **India**, **Siam**, the **Malay Peninsula**, and **Sumatra**, and I can find no definite characters to separate my series from the **Philippines**, Morotai in the **Moluccas**, **New Guinea**, western **New Britain**, and northeastern **Australia**. However, there is both individual and geographical variation in (for example) exact form of prothorax, and careful study of the whole assemblage from localities outside as well as in New Guinea may show that more than one species is involved. Such a study is beyond the scope of the present work. For further notes on geographical variation of the present species see under the following one.

Abacetus straneoi n. sp.

Description. A medium-sized, moderately convex *Abacetus* with prothorax narrowed posteriorly (form as figured, fig. 52); black, appendages brownish red; rather shining, elytra not or at most faintly iridescent; microsculpture isodiametric or slightly transverse on head and pronotum, finer and more transverse on elytra. *Head* .66 and .63 width prothorax; eyes moderately prominent, genae short, forming slightly obtuse angles with neck; antennae pubescent from 4th segments, with middle segments (not including pubescence) nearly 3X long as wide; front evenly convex except for short sublinear frontal foveae which curve outward posteriorly toward anterior supraocular setae; mentum with a rather long, simple tooth at middle. *Prothorax:* width/length 1.24 and 1.27; base/apex 1.11 and 1.10; base/head 1.15 and 1.15; base subtruncate except slightly oblique at sides; apex subtruncate or very broadly emarginate, with anterior angles not otherwise advanced; sides broadly rounded anteriorly, nearly straight and converging posteriorly, sometimes slightly sinuate; margins rather narrow, slightly wider posteriorly; posterior angles well defined but obtuse, except denticulate; disc with anterior transverse impression almost obsolete; middle line normally impressed but abbreviated at both ends;

baso-lateral impressions linear, parallel, about midway between middle and sides of pronotum and about ⅓ as long as latter, not or only vaguely connected with marginal gutters posteriorly. *Elytra* about ⅓ wider than prothorax (E/P 1.34 and 1.32); humeri in profile rounded but normally prominent; basal margin entire, obtusely angulate at humeri; striae rather deep, entire, not distinctly punctate; 3rd interval with puncture on inner edge behind middle. *Inner wings* fully developed. *Lower surface* impunctate but with well impressed, mostly isodiametric microsculpture; metepisterna long; stridulating files present. *Legs:* normal; tarsi not striolate and not distinctly sulcate; spur of front tibia not trifid; 5th tarsal segments without accessory setae. *Secondary sexual characters* normal. *Measurements* (types): length *c.* 5.0-5.7; width *c.* 1.9-2.1 mm. (Lake Daviumbu specimens are larger).

Types. Holotype ♂ (M.C.Z. No. 30,218) and 14 paratypes from Dobodura, Papua, Mar.-July 1944 (Darlington); 12 paratypes from Oro Bay (near Dobodura), Dec. 1943-Jan. 1944 (Darlington).

Other material. Papua: 14, Lake Daviumbu, Fly R., Aug. 19-30, Sept. 11-20, and Sept. 21-30, and 4, Palmer R. at Black R., June 15-22, 1936 (all Archbold Expedition, A.M.N.H.) probably taken at light. Also 1 from Linga Linga Plain W. of Willaumea Peninsula, New Britain, 1 m. altitude, Apr. 9, 1956 (J. L. Gressitt, Bishop Mus.) collected in light trap.

Measured specimens. The ♂ holotype and 1 ♀ paratype from Dobodura.

Notes. My specimens of *Abacetus* from Dobodura and Oro Bay clearly divide into two groups as indicated in the key (above), and so do those from Lake Daviumbu. The numerous specimens of the genus from farther west in New Guinea do not seem to divide in this way, although they vary somewhat individually, and they tend to be intermediate between the two eastern forms, but closer to *haplosternus*. I am interpreting this as a case of character displacement in eastern New Guinea, although other explanations are possible.

At least three species that seem to be more or less related to *haplosternus* occur on the Cape York Peninsula, Australia (collected by me in 1958), but the present new one seems different from them all.

Abacetus convexiusculus Chaudoir

Chaudoir 1869, Bull. Soc. Nat. Moscou **42**, Part 1, No. 2, p. 385 (erroneously numbered 395).

Tschitschérine 1900, Horae Soc. Ent. Rossicae **34**, p. 286.

Andrewes 1933, Tijdschrift Ent. **1933**, p. 325.

Description. A medium-small, aeneous black, very convex *Abacetus* with rounded-cordate prothorax, distinguished (in New Guinea) by characters given in the preceding key. Proportions: head .65 and .68 width prothorax; prothoracic width/length 1.22 and 1.20, base/apex 1.04 and 1.00, base/head 1.03 and .93; width elytra/prothorax 1.35 and (not calculated). *Measurements:* length 4.7-5.5; width 1.9-2.1 mm.

Type. From **Celebes** (Wallace), now in Oberthür collection, Paris Mus.

Occurrence in New Guinea. Recorded by Tschitschérine from **Salawati Island** off the western tip of New Guinea. The only specimens I have seen that purport to come from New Guinea itself are labeled as from Dor(e)y and are therefore doubtful (see p. 331).

Measured specimens. Two ♀ ♀ from Dor(e)y.

Notes. A. convexiusculus is the easternmost member of a primarily Oriental species-group which is not directly related to *haplosternus* etc.

Genus Lesticus Dejean

Dejean 1828, Spécies Général Coleop. **3**, p. 189.

Sloane 1907, Deutsches Ent. Zeitschrift **1907**, pp. 470-472 (including key to species of New Guinea and Australia).

Kuntzen 1914, Sitzungsberichte Gesellschaft naturforschender Freunde Berlin **1914**, pp. 41 ff. (zoögeography of subtribe and genus).

Csiki 1929, Coleop. Cat., Carabidae, Harpalinae **3**, p. 518 (see for additional references and subgenera).

Pseudaloma Straneo 1938, Mem. Soc. Ent. Italiana **16**, p. 226 (new synonym).

Diagnosis. The group to which this genus belongs is defined by technical characters of the mouth-parts that need not be given here. The genus can be identified in New Guinea by characters given in the key on page 499. This genus includes the largest Carabidae in New Guinea excepting the enormous *Catadromus tenebroides*, but this emphasizes the small size of most New Guinean Carabidae rather than the large size of *Lesticus*,

for the largest *Lesticus* in New Guinea is only one inch long.

Description. None required here.

Genotype. L. janthinus Dejean, of Java.

Generic distribution. Southern Asia, north to North China and Japan, and across the Malay Archipelago to the Philippines, New Guinea, the Solomons, and northeastern Australia.

Notes. This genus represents the subtribe Trigonotomina, which is confined to the Oriental-Australian area. The only other large genus of the subtribe is *Trigonotoma*, which includes many species in southern Asia and the western part of the Malay Archipelago and which extends east to the Philippines, Celebes, and the Moluccas (Ternate), but not to New Guinea. Some species of *Trigonotoma* are flightless, localized on high mountains, as some species of *Lesticus* are in New Guinea. This is of course a matter of local differentiation and adaptation, including wing atrophy, in each special case.

I have examined the unique type of *Pseudaloma andrewesi*, from Sumbawa, and so far as I can see it is simply a *Lesticus* which has undergone wing-atrophy and become modified for a flightless existence. It is almost exactly matched in generic (but not specific) characters by *Lesticus toxopei* and *ambulatus* from New Guinea, except that the labrum is pointed at middle in *andrewesi* but not in the New Guinean species. The original description of *Pseudaloma andrewesi* states that the 3rd elytral interval is impunctate, but this is an error; the 3rd intervals of the type are 2-punctate, the anterior puncture being less than ¼ from base attached to 3rd stria, the posterior somewhat behind middle attached to 2nd stria. The prosternal process of the type has several punctures at apex and was probably once setose, and the last 3 ventral segments are transversely impressed near base as usual in *Lesticus*. I mention this genus here because the two New Guinean species named above might have to be referred to it, if it were recognizable.

Some of the New Guinean species of *Lesticus* vary so much both individually and geographically that they cannot be properly understood without study of more material than is now available. It will also be necessary to see some of the older types to assign the names properly—but there is little use studying the types without adequate material for reference. My treatment of the genus is therefore tentative.

The species of *Lesticus* that I have collected were under various sorts of cover on the ground in damp places (but not specifically beside open water), usually in rain forest.

One species of *Lesticus* that has been listed from New Guinea probably does not occur there. It is

(LESTICUS BENNIGSENI Sloane)

Sloane 1907, Deutsche Ent. Zeits. **1907**, pp. 471, 472.
Kuntzen 1914, Sitzungberichte Gesellschaft naturforschender Freunde Berlin **1914**, pp. 48, 49.

Notes. This species need not be discussed here except to note that the type came from Herbtshohe, Gazelle Peninsula, which is on the island of **New Britain**, not New Guinea. I have before me a specimen from "Neu-Pommern" (= New Britain), borrowed from the Hungarian National Mus., which fits the description and which seems to represent a species that I have not seen from New Guinea.

I am unable to recognize the following *Lesticus* described from New Guinea.

LESTICUS LEMOULTI Kuntzen

Kuntzen 1913, Ent. Rundschau **30**, p. 11.
—— 1914, Sitzungsberichte Gesellschaft naturforschender Freunde Berlin **1914**, pp. 48, 49.

Description. Rather large; dark, head and pronotum copper-greenish-bronze, elytra blue-green with violet reflections at sides and blue-black margins; prothorax probably cordate, about equally wide in front and behind; elytra with punctate striae, deeper laterally and apically, and 3rd interval 2- or 3-punctate; proepisterna heavily punctate; length 21.7 mm. For additional details see original description.

Type. From Yule Is., south coast of **Papua**, received from Le Moulte, now presumably in Berlin University Zool. Mus.

Occurrence in New Guinea. Known only from the type. But the species will probably prove to be known elsewhere under another name.

Notes. This species is not included in the following key. Kuntzen says it is near *bennigseni* Sloane, which he did not know. He compared it also with *nitescens*.

Key to Species of Lesticus of New Guinea

1. Metepisterna longer, outer edge 1½× or more as long as anterior edge; wings usually (not always) fully developed; proepisterna often (not always) punctate 2

— Metepisterna shorter, outer edge (not including posterior lobes) not or not much longer than anterior edge; wings reduced; proepisterna not punctate 5

2. Apices of elytra pointed or subdenticulate, the points usually a little removed from suture so apices briefly dehiscent; (winged; eyes relatively large; proepisterna usually but not always punctate) (p. 524) *gracilis*

— Elytra not pointed or subdenticulate; (other characters variable, but often not as above) 3

3. Intervals 7 and 8 strongly convex toward apex; large (*c.* 24 mm.), broad, slightly depressed; sides of prothorax straight (and converging) or only slightly sinuate posteriorly; elytra with striae very fine or faint on disc, but striae 7 and 8 deeper and punctate; (wings full or reduced; proepisterna punctate or not) (p. 526) ..... *politus*

— Intervals 7 and 8 usually not strongly convex toward apex; if these intervals convex, other characters not as above 4

4. Winged (p. 527) ..... *chloronotus*

— Wings reduced (and elytra somewhat narrowed anteriorly) (p. 528) *nitescens*

5. Prothorax very wide anteriorly, with sides strongly converging but only slightly sinuate posteriorly; form depressed (p. 529) ..*depressus*

— Prothorax not very wide anteriorly; form less depressed 6

6. Prothorax with lateral margins widening only near base; elytral 3rd interval with only 1 fixed puncture or none; elytral margins without subapical interruptions (p. 530) ..... *toxopei*

— Prothorax with lateral margins widening from about anterior setae to base; elytral 3rd interval 2- or 3-punctate; elytral margins with subapical interruptions (p. 531) ..... *ambulator*

Lesticus gracilis n. sp.

Description. Form about average for genus but legs and antennae a little more slender than usual; moderately convex; black, appendages (especially outer segments of antennae) partly brownish; a little less shining than usual, especially elytra of ♀; reticulate microsculpture not visible on front, faint or indistinct on pronotum, fine but very distinct and nearly isodiametric on elytra. *Head* .69 and .70 width prothorax; eyes large and prominent (in genus), genae short and oblique; antennae with middle segments 3X or slightly more long as wide; mandibles strongly curved and acutely produced as usual; front transversely impressed between anterior parts of eyes; frontal foveae rather deep, short, irregular, but with linear grooves behind them; neck deeply tranversely impressed between posterior edges of eyes; clypeal suture fine; clypeus subtruncate at

middle, slightly advanced at sides; labrum broadly emarginate; surface of front finely and inconspicuously punctulate. *Prothorax* cordate; width/length 1.42 and 1.46; base/apex 1.12 and .99; base/head 1.01 and .90; sides rather strongly rounded through much of length, variably (often rather strongly) sinuate before base; base subtruncate except slightly lobed each side; apex broadly emarginate, but angles otherwise scarcely advanced; lateral margins moderate, of about equal width throughout, each with usual 2 setae about 2/5 from apex and almost on basal angle; basal angles more or less obtuse, blunted; disc with anterior and posterior transverse impressions weak, middle line finely impressed and not quite reaching base or apex; basolateral impressions rather shallow, poorly defined, impunctate or subpunctate. *Elytra* somewhat wider than prothorax (E/P 1.21 and 1.21), only slightly narrowed anteriorly; humeri rounded-prominent; margins ending inwardly at end 3rd striae, obtusely angulate at humeri; apices pointed or denticulate, the points usually a little outside suture so apices briefly dehiscent; striae distinct but rather lightly impressed on disc, deeper laterally and apically, faintly punctulate on disc, more distinctly so laterally; 7th and 8th intervals strongly convex before apex; 3rd intervals 3-punctate, anterior puncture on or near 3rd stria, others on or near 2nd stria. *Inner wings* fully developed. *Lower surface:* prosternal process nearly flat, without setae; metepisterna long (in genus); proepisterna usually punctate but variably so, the punctures sometimes lacking on one or both sides; mes- and metepisterna and sides of metasternum punctate; sides of abdomen not punctate except along basal sutures; 3 last ventral segments deeply transversely impressed basally. *Legs* normal except somewhat longer and more slender than usual. *Secondary sexual characters* normal for genus; ♂ with anterior tarsi moderately dilated, first 3 segments conspicuously squamulose below and 4th segment sometimes inconspicuously so. *Measurements:* length *c.* 17-22; width *c.* 6-8 mm.

Types. Holotype ♂ (Leiden Mus.) and 3 paratypes from Bernhard Camp, Snow Mts., **Neth. N. G.**, 50 m. (*c.* 150 ft.), July-Sept. 1938 (J. Olthof), and additional paratypes from **Neth. N. G.** as follows: 4, Baliem Camp, Snow Mts., 1600 m., Dec. 1938 (Toxopeus); 1 ♂, Hollandia, Apr. 1945 (Malkin, U.S.N.M.); 1 ♀, same locality, July-Sept. 1944 (Darlington). Paratypes in M.C.Z.: No. 31,219.

Measured specimens. The ♂ holotype and 1 ♀ paratype from Bernhard Camp.

Notes. This species seems reasonably well defined by the combination of characters given in the key, the acute apices of the elytra being of course most important.

Lesticus politus Chaudoir

Chaudoir 1868, Ann. Soc. Ent. Belgique **11**, p. 156.
Macleay 1886, Proc. Linn. Soc. New South Wales **11**, p. 141.
Tschitschérine 1900, Horae Soc. Ent. Rossicae **34**, p. 180.
Sloane 1907, Deutsche Ent. Zeits. **1907**, p. 472.
Kuntzen 1911, Ent. Rundschau **28**, p. 165.
—— 1914, Sitzungsberichte Gesellschaft naturforschender Freunde Berlin **1914**, pp. 48 ff.

Description. None needed here. This is the largest *Lesticus* in New Guinea; its characters are summarized in the key (p. 523); and it is compared with other species in notes (below). Proportions: head .67 and .72 width prothorax; prothoracic width/length 1.41 and 1.42, base/apex 1.00 and .95, base/head 1.00 and .88; width elytra/prothorax 1.23 and 1.25. *Measurements* (both specimens here listed): length *c.* 24; width *c.* 9 mm.

Type. A ♂ supposedly from New Guinea collected by Wallace, presumably now in Oberthür collection at Paris Mus. As usual in the case of Wallace's specimens (p. 331), "New Guinea" must be accepted with reservation. The specimen may have come from Celebes. If it did come from New Guinea, it was presumably from western **Neth. N. G.**, from the Vogelkop.

Occurrence in New Guinea. **N-E. N. G.**: 1 ♀, Erima, Astrolabe Bay, 1897 (Biró, Hungarian National Mus.); and recorded by Kuntzen (1911) from Hatzfeldt Harbor ("Hatzfeldhafen"). **Neth. N. G.**: 1 ♀, "Neth. New Guinea" without further locality, Sept. 10, 1944 (T. Aarons, California Acad.).

Measured specimens. The 2 ♀ ♀ recorded above.

Notes. These specimens are identified from description but answer the description well. They are larger and broader than the largest individual of *graeilis* (above), more shining, with relatively shorter appendages, and unmodified elytral apices. They are larger and more lightly striate than *chloronotus*, with sides of prothorax much less sinuate. The specimen from Neth. N. G. has fully developed folded wings and impunctate proepisterna; that from Erima, wings reduced, about ⅘ as long as elytra, unfolded, and proepisterna coarsely punctate, with 20-odd punctures on left and 13 on right side. Nevertheless, these specimens are so much alike in other ways that I am reasonably sure they are one species. Kuntzen (1911) records *politus* from

New Britain ("Neupommern") and the **Admiralty Is.** as well as from New Guinea, but his identifications are perhaps doubtful.

Lesticus chloronotus Chaudoir

Chaudoir 1868, Ann. Soc. Ent. Belgique **11**, p. 156.
Sloane 1907, Deutsche Ent. Zeits. **1907**, p. 472.
Kuntzen 1914, Sitzungsberichte Gesellschaft naturforschender Freunde Berlin, pp. 45 ff.
?var. *dahli* Kuntzen 1913, Ent. Rundschau **30**, p. 12.
—— 1914, Sitzungsberichte Gesellschaft naturforschender Freunde Berlin pp. 48 ff.

Description. Lesticus chloronotus, in Australia, is a medium-sized to large, greenish black, rather shining, winged species, with unmodified elytral apices. The elytral striation varies: all the striae are at least lightly impressed in specimens from most Australian localities, but specimens from the general area of the Rocky Scrub and Coen in the middle part of the Cape York Peninsula are more lightly striate as well as somewhat larger: 7th and 8th intervals are strongly convex before apex in all specimens. The proepisterna sometimes are and sometimes are not coarsely punctate in Australian specimens; the variation is individual. Proportions: head .73, .70, .73 width prothorax; prothoracic width/length 1.38, 1.42, 1.42; base/apex 1.02, 1.01, 1.09; base/head .97, .97, .97; width elytra/prothorax 1.28, 1.24, 1.31. *Measurements:* length *c.* 20-23; width *c.* 7-8 mm. (Australian specimens); 19½ x 6.9mm. (Yule Is. example).

Types. From **Australia** without more exact locality; presumably now in the Oberthür collection, Paris Mus.

Occurrence in New Guinea. Somewhat doubtful. Kuntzen (1913) records what he calls variety *dahli* from Hatzfeldhafen, **N-E. N. G.**, as well as from **New Britain** and **Admiralty Is.**, but I am not sure that these specimens really represent *chloronotus*. The only specimen I have seen from New Guinea that seems to be this species is from "Yule Island" (south coast of **Papua**), in Hungarian National Mus. I identify it with some doubt, for 7th and 8th elytral intervals are less prominent toward apex than they should be. However, the specimen is teneral, still reddish brown in color, and the elytra may not have been fully formed and hardened when it was killed. The proepisterna are almost impunctate, with a single coarse puncture on left side only.

Measured specimens. A ♂ from Mt. Fox plateau and ♀ from near Cairns, North Queensland, Australia, and the Yule Is. (♀) specimen; proportions given in this order.

Notes. In Australia this species ranges at least from part of the Cape York Peninsula south to Port Macquarie in northern New South Wales. It is usually found under cover on the ground in more or less wet forest but not associated with open water.

Lesticus nitescens Sloane

Sloane 1907, Deutsche Ent. Zeits. **1907**, pp. 470, 472.
Kuntzen 1911, Ent. Rundschau **28**, p. 165.
—— 1914, Sitzungsberichte Gesellschaft naturforschender Freunde Berlin **1914**, pp. 48 ff.

Description. A medium-sized *Lesticus* of about average form (except humeri somewhat more narrowed than in winged species) and convexity; rather shining black, sometimes with metallic color; technical characters indicated in key (p. 523). *Proportions:* head .72 and .71 width prothorax; prothoracic width/length 1.32 and 1.26, base/apex 1.06 and 1.07, base/head 1.01 and 1.03; width elytra/prothorax 1.24 and 1.26. *Measurements:* length *c.* 18-21; width *c.* 6.5-7.7 mm.

Type. From "Simbang, New Guinea"; this is one of Biró's localities on Huon Gulf, **N-E. N. G.** A second specimen listed by Sloane was from Herbetshohe, Gazelle Peninsula, **New Britain**. The type should be in Entomological Mus., Berlin-Dahlem.

Occurrence in New Guinea. **N-E. N. G.**: 2, Wamuki, Mongi Watershed, Huon Peninsula, 800 m. (*c.* 2600 ft.), Apr. 19-20, 1955 (E. O. Wilson, M.C.Z.); 1, Bandong, Bunbok Valley north of Lae, 1300 m. (*c.* 4225 ft.), May 26, 1955 (E. O. Wilson, M.C.Z.); and Sattelberg (Kuntzen 1911). **Neth. N. G.**: 2, Wareo (in Andrewes' collection, received from Hauser); actually only one of these specimens bears the "Wareo" label, but the other specimen resembles the first one and has the same "Ex Coll. G. Hauser" label.

Measured specimens. The 2 (♂ ♀) from Wamuki.

Notes. The specimens listed above are darker (less metallic) and probably also more convex than Sloane's types, but I prefer to assign them here rather than make another new name or names in this already somewhat confused group. The specimen from Bandong has the 7th and 8th elytral intervals strongly convex toward apex; the other specimens have these intervals almost flat; and the specimens from Wareo differ slightly in form and appearance from the others. More material is needed to show whether this variation is individual or whether more than one species or subspecies is represented.

LESTICUS DEPRESSUS n. sp.

Description. Medium-large, relatively broad and depressed (form as figured, fig. 53); color black with strong greenish tinge above, appendages brownish black, outer segments of antennae browner; reticulate microsculpture (very fine, nearly isodiametric or slightly transverse) visible on most of upper surface but most distinct on elytra. *Head* .78 width prothorax; eyes small, genae rounded in profile, about as long as eyes and almost as prominent; antennae with middle segments about 3X long as wide; front moderately convex; clypeal suture very deep; neck impression slight; frontal sulci sublinear, deeply impressed, strongly curving outward posteriorly toward anterior part of eyes; clypeus rather deeply obtusely emarginate; labrum less deeply rounded-emarginate. *Prothorax* subcordate, very wide anteriorly; width/length 1.35; base/apex .76; base/head .84 (base measured between posterior submarginal setae); base subtruncate, rounded-oblique toward sides; apex broadly emarginate at middle, truncate or slightly retracted toward sides so that anterior angles are not at all prominent anteriorly; sides slightly arcuate for most of length, strongly converging and slightly sinuate before base; side margins moderate but disc beside them more or less depressed so that margins appear wider than usual: each margin 2-setose as usual, anterior seta about ⅔ from apex, posterior slightly before basal angle; basal angles obtuse, narrowly rounded; disc only moderately convex, with anterior and posterior transverse impressions slight; middle line fine, much abbreviated basally; basol-lateral impressions shallow, poorly limited, not punctate. *Elytra* ⅕ wider than prothorax (E/P 1.20), rather strongly narrowed anteriorly, depressed, not margined in front inside humeri; margins with subapical interruptions as usual in tribe; apices broadly rounded with sutural angles narrowly rounded; striae almost obsolete (faintly, irregularly indicated) except 8th well impressed; other striae deeper at extreme apex, and 7th and 8th intervals convex before apex but not strongly so; 3rd interval impunctate. *Inner wings* evidently reduced, but not directly examined. *Lower surface:* metepisterna (not including lobes) scarcely longer than wide; proepisterna impunctate, mesepisterna with some rather small punctures, but metepisterna and sides of abdomen impunctate; last 3 ventral segments strongly impressed across base as usual. *Legs* apparently normal. *Secondary sexual characters* (of ♀) normal: last ventral segment with two apical setae each side. *Measurements:* length 21; width 7.2 mm.

Type. Holotype ♀ (British Mus.) from Snow Mts., **Neth. N. G.**, 4000-6000 ft., Jan.-Feb. 1913 (A. F. R. Wollaston); the type is unique.

Measured specimen. The type.

Notes. Its form and color instantly distinguish this species from all others known from New Guinea.

Lesticus toxopei n. sp.

Description. Rather slender and depressed; brownish black, appendages brownish; reticulate microsculpture absent on front (but latter faintly punctulate), light and somewhat transverse on pronotum, more distinct (but fine) and isodiametric or slightly transverse on elytra. *Head* .87 width prothorax; eyes rather large (in genus), genae very short and oblique; antennae with middle segments about 2X long as wide; mandibles strongly curved but with apices very long and slender; front slightly impressed transversely between anterior parts of eyes; neck constriction almost obsolete; clypeal suture deeply impressed; clypeus bisinuate, faintly lobed at middle and slightly advanced at sides; labrum broadly emarginate; frontal sulci short, deep, linear, diverging posteriorly, ending near anterior supraocular setae; mentum with a very broad truncate tooth (or could be described as truncate with emarginations on each side). *Prothorax* narrowly subcordate; width/length 1.22; base/apex .87; base/head .79; sides not very strongly rounded for about ¾ of length, moderately sinuate before base; side margins rather narrow anteriorly, slightly broader in basal ¼, each with usual 2 setae about ⅓ from apex and near (very slightly before) basal angle; base irregularly subtruncate; apex subtruncate except slightly emarginate at middle; anterior angles not advanced; disc rather flat, with anterior and posterior impressions very weak, middle line fine and slightly abbreviated anteriorly and posteriorly; baso-lateral impressions shallow and poorly defined but extending vaguely well forward onto disc, impunctate. *Elytra* about ¼ wider than prothorax (E/P 1.27), rather strongly narrowed anteriorly (widest well behind middle), so humeri not prominent; basal margins joining and ending at bases of 3rd striae, obtusely angulate at humeri; lateral margins narrow; subapical sinuations virtually absent, and usual interruptions of margins absent; apices rather narrowly independently rounded; striae virtually entire but very lightly impressed, 7th not much deeper but 8th deep and with ocellate punctures

as usual; 7th and 8th intervals only slightly convex toward apex; 3rd interval impunctate on left elytron, 1-punctate on right, the puncture being near 3rd stria less than ¼ from base. *Inner wings* evidently vestigial but not examined. *Lower surface:* prosternal process without setae; metepisterna (not including posterior lobes) with outer edge slightly shorter than anterior edge; whole lower surface almost impunctate except for some rather light punctures on mesepisterna; last three ventral segments transversely impressed basally as usual. *Legs* without obvious special characters (as compared with other *Lesticus*). *Secondary sexual characters* (of ♀) normal; ♀ with anterior tarsi not dilated, and 2 setae each side last ventral segment. *Measurements:* length 18; width 5.8 mm.

Type. Holotype ♀ (Leiden Mus.) from Moss Forest Camp, Snow Mts., **Neth. N. G.**, 2600-2800 m. (about 8450-9100 ft.) (Toxopeus); the type is unique.

Measured specimen. The type.

Notes. This species is noteworthy for loss of subapical interruptions of the elytral margins — there is simply no trace of interruptions as the elytra are looked at from the side in normal closed position. The interruptions are supposed to be a tribal character of Pterostichini, but their loss is not really very important taxonomically in the present case, for the present species is in most ways not very different from the following one, in which the interruptions are still distinct. The interruption of the margin is connected with the internal plica of the elytron which probably has a supporting function in winged Pterostichini. Its loss in the present species may be an indirect result of atrophy of the wings and adaptation to a flightless existence.

Lesticus ambulator n. sp.

Description. Rather small and narrow (form as figured, fig. 54, but rather variable, with some sexual dimorphism — see elytra), moderately convex; black or brownish black, appendages dark reddish, outer segments of antennae browner; moderately shining, reticulate microsculpture absent on front (but latter with faint punctulation), virtually absent on pronotum (which also is faintly punctulate or with broken fragments of reticulation), light but distinct and nearly isodiametric or slightly transverse on elytra. *Head* large, .79 and .88 width prothorax; eyes smaller and flatter than in preceding species (*toxopei*), enclosed by rather long oblique genae posteriorly;

mandibles strongly curved, acutely pointed, but less drawn out at apex than in preceding species; antennae with middle segments (not including pubescence) about 2X long as wide; clypeus and labrum both broadly emarginate; front weakly and neck still more weakly transversely impressed, but clypeal suture sharply impressed; frontal foveae short, linear, well impressed, diverging posteriorly and ending before reaching anterior supraocular setae; mentum with very broad subtruncate (but variable) tooth. *Prothorax* narrowly subcordate; width/length 1.22 and 1.18; base/apex 1.00 and .93; base/head .95 and .85; sides not very strongly arcuate for about ¾ of length, then moderately sinuate to base; side margins rather narrow anteriorly, widening posteriorly beginning near anterior lateral setae; each margin with usual 2 setae about ⅓ from apex and at basal angle: base subtruncate at middle, vaguely oblique toward sides; apex subtruncate, with anterior angles not advanced except actual lateral margins slightly so; disc with usual weak transverse impressions and very fine middle line more or less abbreviated at both ends; baso-lateral impressions deeper than in preceding species but poorly limited, impunctate. *Elytra* about ⅕ to ⅖ wider than prothorax (E/P 1.22 and 1.42), widest behind middle (more narrowed at base and expanded posteriorly in ♀ than in ♂); basal margin fine and sometimes interrupted, usually ending at base 3rd stria, rounded-angulate at humeri; sides sometimes subsinuate behind humeri, with weak subapical sinuations and margins distinctly interrupted as usual in Pterostichini; apices rather narrowly independently rounded; striae almost obsolete (indicated by inequalities of the surface and sometimes some irregular punctulation); 8th and 9th only slightly impressed but indicated by rows of punctures; intervals not convex toward apex or at most very slightly so; 3rd interval 2- or 3-punctate (2 anterior punctures always present on each elytron; posterior puncture present on both sides in 1, and on 1 side in 3 individuals; 1 individual with right elytron 4-punctate). *Inner wings* vestigial, vestiges scarcely extending beyond posterior edge of metathorax. *Lower surface* virtually impunctate except sometimes with faint traces of punctures on mesepisterna; prosternal process sometimes with (usually without) single setae, declivity irregularly rounded or flattened (variable); metepisterna (not including lobes) about long as wide; last three ventral segments transversely impressed across base as usual. *Legs* not obviously different from other *Lesticus*.

Secondary sexual characters normal: ♂ with anterior tarsi moderately dilated, first 3 segments biseriately squamulose; ♂ with 1, ♀ 2 setae each side apex last ventral segment. *Measurements:* length *c.* 15-16½; width 4.8-5.7 mm.

Types. Holotype ♂ (M.C.Z. No. 30,220) and 12 paratypes all from Mt. Wilhelm, Bismarck Range, **N-E. N. G.**, 7,000-10,000 ft., Oct. 1944 (Darlington).

Measured specimens. The ♂ holotype and 1 ♀ paratype.

Notes. This very distinct species is, I suppose, related to the preceding one, from the Snow Mts. Other related species are to be expected on other high peaks in New Guinea. My specimens were taken under logs and other cover on the ground in wet cloud forest or moss forest.

Rhytiferonia New Genus

Diagnosis. Medium-large, rather parallel-sided but convex, flightless pterostichines, characterized (in the New Guinean fauna) as indicated in key to genera (p. 499).

Description. Head of moderate size; mandibles rather long (but not excessively so), rather weakly arcuate, pointed, without setae in scrobes; antennae not moniliform, pubescent from 4th segment; all palpi slender in both sexes; labium rather broad, 2-setose; paraglossae slender, longer than central part of labium, maxillae with inner lobe broadly but strongly arcuate, pointed at apex, inner edge closely fringed with long bristles; mentum toothed, tooth deeply emarginate at apex. *Prothorax* with baso-lateral impressions irregular (not linear), more or less continuous with depressed basal parts of lateral margins. *Elytra* with subapical sinuations and strong interruptions of margin; basal margin entire, joining sutural striae at base; basal punctures absent; scutellar strioles absent; 9th stria and 10th interval present in about posterior ½ of elytral length; 3rd interval impunctate. *Lower surface:* prosternum with process not margined, without setae, posterior declivity rather broad, flat; proepisterna longitudinally rugulose on inner ½; metepisterna (not including posterior lobes) short, not much longer than wide; last 3 ventral segments strongly transversely impressed at base. *Inner wings* evidently vestigial, elytra (lightly) connate. *Legs:* tarsi rather short (but not extremely so), upper side at most faintly sulcate on outer side only; 5th tarsal segments with accessory setae. *Secondary sexual characters* normal: ♂ front

tarsi widely dilated, dilated segments not oblique, first 3 biseriately squamulose; ♂ with 1, ♀ 2 setae each side last ventral segment.

Genotype. Rhytiferonia nigra (below).

Generic distribution. Known only from high altitudes on the Snow Mts., **Neth. N. G.**: apparently *not* represented on the Bismarck Range in N-E. N. G.

Notes. So far as I can determine, this new genus has no close relatives anywhere on the Malay Archipelago. At first sight it resembles nothing in Australia either. It is vaguely similar to some species of *Sarticus*, but there is obviously no real relationship. But the rugulose proepisterna suggest an affinity with *Rhytisternus*, and this is at least consistent with the bifid mentum tooth, absence of scutellar strioles, and absence of punctures on 3rd elytral intervals. However, the new genus differs from *Rhytisternus* not only in shorter metepisterna (this is a secondary adaptive character, following atrophy of inner wings) but also in lacking punctures at bases of 2nd elytral striae, in having partial but well developed 10th elytral intervals, and especially in having transversely impressed ventral segments. My guess is (and it is only a guess) that the new genus is derived from an originally Australian stock related to *Rhytisternus*. If so, it is thoroughly differentiated.

The species of this new genus superficially resemble *Haploferonia* (p. 547), but the technical characters (within the Pterostichini) are very different. The 2 genera presumably represent parallel or convergent modifications of two different stocks.

Key to Species of Rhytiferonia

1. Prothorax subquadrate, with comparatively weakly rounded sides; genae not or not much more prominent than eyes (p. 534) *nigra*
— Prothorax more broadly rounded at sides; genae more prominent than eyes (p. 536) *iebele*

Rhytiferonia nigra n. sp.

Description. Form (fig. 55) as described under genus; black, rather dull, appendages piceous or reddish piceous with outer segments of antennae browner; reticulate microsculpture of small meshes, isodiametric on head and elytra, slightly transverse on pronotum. *Head* .73 and .76 width prothorax; eyes rather small, enclosed behind by genae, which are about as long and as prominent as eyes, but somewhat variable; antennae rather stout,

middle segments about 2X or slightly less long as wide; front moderately convex; frontal foveae rather short, irregular, weakly impressed; clypeal suture indicated (variably); neck impression slight or absent; 2 supraocular setae each side. *Prothorax* subquadrate; width/length 1.16 and 1.19; base/apex *c.* 1.04 and 1.04; base/head *c.* 1.06 and 1.01; sides slightly and sometimes irregularly arcuate through whole length; base subtruncate or slightly emarginate at middle, slightly oblique at sides, not margined; apex subtruncate or broadly emarginate, with anterior angles slightly advanced; apex not margined except near angles; side margins narrow in anterior ½, widening posteriorly and joining baso-lateral impressions in an (irregular) impression; each margin with usual 2 setae about ⅓ from apex (a little inside marginal channel) and before (and a little inside of) basal angle; basal angles moderately rounded; disc rather strongly convex; transverse impressions weak; middle line fine, abbreviated at both ends; baso-lateral impressions as described under genus, impunctate. *Elytra* about ⅕ wider than prothorax (E/P 1.19 and 1.23), widest a little behind middle, with sides slightly arcuate except just behind humeri; basal margin angulate (almost right) and usually finely dentate at humeri; striae entire, well impressed, not distinctly punctate; intervals moderately convex. *Inner wings* vestigial. *Lower surface* as described under genus; proepisterna longitudinally strigulose (as described) but body below virtually impunctate. *Legs* rather stout; posterior trochanters bluntly pointed in both sexes; tarsi as described under genus. *Secondary sexual characters* as described under genus. Male copulatory organs as figured (fig. 63). *Measurements:* length 18½-21; width 6.0-6.7 mm.

Types. Holotype ♂ (Leiden Mus.) from Lake Habbema, Snow Mts., **Neth. N. G.**, 3300 m. (*c.* 10,725 ft.), Oct. 2, 1938 (Toxopeus); and 1 ♀ paratype (M.C.Z. No. 30,221) with same data as holotype except altitude given as 3250-3300 m. (*c.* 10,575-10,725 ft.) and date as "Ult. VII-ult. VIII."

Additional material. The following 4 specimens from the Snow Mts. are assigned to the present species but not as types; they vary individually and possibly (in a minor way) geographically: 2 ♂ ♂, Moss Forest Camp, 2600-2800 m. (*c.* 8450-9100 ft.), Oct. 9- Nov. 5; 1 ♂, Scree Valley Camp, 3800 m. (*c.* 12,350 ft.), Sept.; 1, Valley N. E. of Mt. Wilhelmina, 3600 m. (*c.* 11,700 ft.), Sept.; all collected in 1938 by L. J. Toxopeus.

Measured specimens. The (♂ ♀) types.

Notes. Although the habitat of this species is not given, it

evidently lives on the ground, and the localities suggest that it occurs both in moss forest and in open country above timber line.

Rhytiferonia iebele n. sp.

Description. Answers the description of the preceding species except in the following details: genae more prominent (more prominent than eyes); prothorax relatively larger, with slightly wider base and more rounded at sides, with basal angles more broadly rounded. Proportions: head .67 and .69 width prothorax; prothoracic width/length 1.20 and 1.18, base/apex 1.10 and 1.11, base/head 1.14 and 1.12; width elytra/prothorax 1.16 and 1.12. *Measurements:* length *c.* 17½-20½; width 5.6-6.3 mm.

Types. Holotype ♀ (Leiden Mus.) and 1 ♀ paratype (M.C.Z., No. 30,222) from Iebele Camp, Snow Mts., **Neth. N. G.**, 2250 m. (*c.* 7325 ft.), Nov.-Dec. 1938 (Toxopeus); 1 ♀ paratype from Iebele River, 2200 m. (*c.* 7175 ft.), Oct. 28, other data as type.

Measured specimens. The holotype and Iebele River paratype.

Notes. The present form is clearly distinguishable from the preceding one, but more material is needed to show whether it should be considered a separate species or a geographical subspecies. *Iebele* occurs at a slightly lower altitude than *nigra*.

Genus Prosopogmus Chaudoir

Chaudoir 1865, Bull. Soc. Nat. Moscou **38**, Part 2, No. 3, p. 92.
Tschitschérine 1890, Horae Soc. Ent. Rossicae **25**, p. 163.
Sloane 1894, Proc. Linn. Soc. New South Wales **29**, p. 428.
—— 1920, Proc. Linn. Soc. New South Wales **45**, pp. 152, 159.
Csiki 1930, Coleop. Cat., Carabidae, Harpalinae **4**, p. 564 (see for synonyms etc.).

Diagnosis. This is, in New Guinea, the only genus of medium-small pterostichines (under 10 mm.) with the last three ventral segments conspicuously transversely impressed basally. Some other characters are indicated in the key (p. 499).

Description. None needed here.

Genotype. Feronia impressifrons Chaudoir of New Zealand.

Generic distribution. Australia, New Zealand, New Guinea, the Moluccas, Fiji (see notes, below).

Notes. I am not sure that the geographically isolated species on New Zealand and Fiji are really congeneric with those from Australia and New Guinea, but I cannot undertake to investigate this now. Different Australian species of the group occur on the

ground under cover in a variety of country including rain forest, open eucalyptus woodland, and grassland.

Prosopogmus garivagliae Straneo

Straneo 1938, Mem. Soc. Ent. Italiana **16**, p. 229.

Description. A black or brassy, ordinary looking carabid with full inner wings, deeply striate elytra, and characters indicated in the key to genera (p. 499). Proportions: head .69 and .68 width prothorax; prothoracic width/length 1.33 and 1.33, base/apex 1.43 and 1.38, base/head 1.30 and 1.33; width elytra/prothorax 1.34 and 1.32. *Measurements:* length *c.* 7.3-9.7; width 2.7-3.3 mm.

Type. A ♀ from **New Guinea** without further locality, in Straneo collection. An additional specimen differing slightly from the type is mentioned by Straneo from Sattelberg, (**N-E. N. G.**), in the Andrewes collection now in British Mus., where I have seen it.

Occurrence in New Guinea. **Papua**: 1, Dobodura, Mar.-July 1944 (Darlington); 2, Owen Stanley Range, Goilala: Bome, 1950 m. (*c.* 6350 ft.), Mar. 8-15, 1957 (W. W. Brandt, Bishop Mus.); 1, same data except Goilala: Tororo, 1560 m. (*c.* 5070 ft.), Feb. 15-20. **N-E. N. G.**: 1, Bulolo, 880 m. (*c.* 2860 ft.), Aug. 23, 1956 (E. J. Ford, Jr., Bishop Mus.), taken in light trap; 1, Finisterre Range, Saidor: Matoko Village, Sept. 6-24, 1958 (W. W. Brandt, Bishop Mus.); 2, Sattelberg, Huon Gulf, 1899 (Biró, Hungarian National Mus.); and 4 labeled simply "N. Guinea, Biró 1899" without further locality; 1, Aitape, Aug. 1944 (Darlington); 59, Chimbu Valley, Bismarck Range, 5000-7500 ft., Oct. 1944 (Darlington). **Neth. N. G.**: 2, Bernhard Camp, 50 m. (*c.* 150 ft.) Aug.-Sept. 1938 (J. Olthof, Leiden Mus.); 2, Baliem Camp, Snow Mts., 1700 m. (*c.* 5525 ft.), Dec. 1938 (Toxopeus). The records suggest that this species occurs throughout New Guinea mostly on the lower and middle mountain slopes, although it occurred virtually at sea level at Dobodura and Aitape.

Measured specimens. A pair (♂ ♀) from Chimbu Valley.

Notes. Variation occurs in this species in depth of elytral striae and convexity of intervals. The variation tends to be altitudinal. Specimens from very low altitudes (those from Dobodura, Aitape, and Bernhard Camp) have elytral striae deeply impressed and discal intervals of elytra only slightly unequal and all rather strongly convex. Specimens from higher

altitudes, including those from Chimbu Valley, Baliem Camp, and Sattelberg, have discal intervals 2, 3, and 4 slightly wider and flatter than the others. However, there is individual as well as altitudinal variation in this character, and it seems unwise to make it the basis of a formal subspecies now. This species is very similar to *P. batjanicus* Straneo (1955, *Atti Soc. Italiana Sci. Nat.* **94**, p. 145) of the Moluccas, and it is also (less) similar to *P. oodiformis* Macleay and *P. delicatulus* Tschitscherine of eastern Australia. The specimens of it that I collected were taken either among dead leaves on the ground in rain forest, or under various cover in the more open, grassy part of the Chimbu Valley. Many of the Chimbu Valley specimens were taken under decumbent strawberry plants in a missionary's garden.

Paraloma New Genus

Diagnosis. Medium-sized, rather stout and depressed, flightless pterostichines, characterized (in the New Guinean fauna) as indicated in the key on page 499.

Description. Head large; mandibles without setae in scrobes, strongly curved, tips long and acute; antennae rather short but not moniliform, pubescent from 4th segment; all palpi slender in both sexes; labium broad, 2-setose; paraglossae slender, not much longer than middle part of labium; inner lobe of maxillae very strongly curved, long-produced, and acute at apex, inner edge with rather sparse, curved bristles; mentum with short, very broad, subtruncate or broadly emarginate tooth. *Prothorax* with baso-lateral impressions moderate, not linear, not separated from depressed part of margins. *Elytra* usually with slight subapical sinuations, with or without interruptions of margin (individual variation!); basal margin entire or obsolete, joining sutural striae at base when entire; basal puncture at base sutural stria (*fortis*) or absent (*gracilis*); scutellar striae present; 9th striae and 10th interval present in about posterior ½ of elytral length; 3rd interval impunctate. *Lower surface:* prosternal process not margined, without setae, posterior declivity rounded; proepisterna more or less wrinkled, but irregularly (not longitudinally) so; metepisterna short; ventral segments not transversely impressed. *Legs:* tarsi at most lightly or indistinctly grooved externally, 5th segments with accessory setae. *Secondary sexual characters* normal: male front tarsi with first 3 segments scarcely or distinctly dilated (not oblique), segments

2 and 3 (and sometimes 1) biseriately squamulose; ♂ with 1, ♀ 2 setae each side last ventral segment.

Genotype. Paraloma fortis (below).

Generic distribution. Known only from high altitudes on the Snow Mts., Neth. N. G.; apparently *not* represented on the Bismarck Range in N-E. N. G.

Notes. I do not know the relationships of this genus. In appearance, *Paraloma fortis* is much like *Nesites* (*Aloma*) *mirum* figured by Andrewes (1931, *J. Federated Malay States Mus.* **16**, p. 449, Fig. 7), but *Paraloma* differs from *Nesites* in having scutellar strioles, ventral segments not transversely sulcate (this is supposedly a very important character), ♀ with 2 setae each side last ventral segment (only 1 in *Nesites*), etc. If *Paraloma* is derived from the same stock as *Nesites*, the divergence is considerable. Perhaps other genera will be found on other high mountains in the Malay Archipelago to suggest the phylogeny of the group.

Key to Species of Paraloma

1. Eyes small, about long as genae; elytra with well defined basal margin (p. 539) . . . . . *fortis*
— Eyes larger, much longer than genae; elytra with basal margin obsolete (p. 540) . . . . . *gracilis*

Paraloma fortis n. sp.

Description. Form (fig. 56) dimorphic (see prothorax), sometimes almost as in *Nesites* (*Aloma*) *mirum* Andrewes; piceous or reddish piceous, appendages reddish; reticulate microsculpture almost obsolete on head (traces apparently isodiametric), partly obsolete or irregular and slightly transverse on pronotum, more distinct and slightly transverse on elytra. *Head* .84, .81, .84 width prothorax; eyes rather small, genae *c.* long as eyes but oblique, not prominent; antennae stout, middle segments 2X or slightly less long as wide; front rather strongly convex; frontal impressions almost obsolete; clypeal suture fine; neck constriction virtually absent; 2 supraocular setae each side; surface of front finely punctulate. *Prothorax* subcordate, dimorphic (anterior angles sometimes very prominent, sometimes not); width/length 1.20, 1.19, 1.23; base/apex .85, .92, .88; base/head .93, .92, .96; sides irregularly and weakly arcuate for ¾ or more of length, broadly but not strongly sinuate before basal angles; base subtruncate (sometimes irregularly so), not margined; apex

broadly and slightly emarginate at middle, vaguely lobed toward sides, not margined; anterior angles variable, sometimes strongly produced and pointed, sometimes only slightly advanced and blunt (dimorphism is individual, not sexual; both sexes are dimorphic); side margins rather narrow anteriorly, broader in posterior ⅓; basal angles slightly variable, right or slightly blunted; each margin with usual 2 setae about ⅓ from apex and *before* basal angle; disc with usual rather weak transverse impressions; middle line fine, more or less abbreviated at both ends; baso-lateral impressions as described under genus, not or vaguely punctate, and area between them not or vaguely punctate; disc with transverse wrinkles especially across middle, and surface more or less punctulate. *Elytra* wider than prothorax (E/P 1.27, 1.29, 1.37), short, widest behind middle, narrowed anteriorly; basal margins entire, angulate (obtuse, not quite right) at humeri; subapical marginal interruption present or absent; apices conjointly rounded or nearly so; striae entire or nearly so (sometimes almost obsolete at apex), irregularly punctulate. *Inner wings* vestigial. *Lower surface* as described under genus: sides of body below slightly wrinkled but not distinctly punctate. *Legs* as described under genus. *Secondary* sexual characters as described under genus; ♂ tarsi scarcely dilated. Male copulatory organs: figure 64. *Measurements:* length 11.7-14.0; width 4.3-5.1 mm.

Types. Holotype ♂ (Leiden Mus.) with prominent anterior prothoracic angles, and 3 paratypes (2 in M.C.Z., No. 30,223) from Camp E. of Mt. Wilhelmina, Snow Mts., **Neth. N. G.**, 3600 m. (*c.* 11,700 ft.), Sept. 1938 (Toxopeus); and 1 paratype from Scree Valley Camp, also Snow Mts., 3850 m. (*c.* 12,500 ft.), 1938 (Toxopeus).

Measured specimens. The holotype (wide ♂) and 2 paratypes (narrow ♂, wide ♀) from Camp E. of Mt. Wilhelmina; sexes of all specimens determined by dissection.

Notes. There is no record of the habitat of this species, but it evidently lives on the ground above timber line.

Paraloma gracilis n. sp.

Description. Answers description of preceding species except in following details: form more slender and graceful; eyes larger and more prominent, genae short, forming strong (but obtuse) angles with neck; anterior angles of prothorax moderately prominent (less so than in "wide" *fortis*), basal angles of prothorax

more rounded but not strongly so; basal margin of elytra obsolete; marginal interruption of elytra almost obsolete; ♂ tarsi more widely dilated than in *fortis*. Proportions: head .86 width prothorax; prothoracic width/length 1.24, base/apex .88, base/head .85; width elytra/prothorax 1.21. *Measurements:* length *c.* 14; width *c.* 4.6 mm.

Type. Holotype ♂ (Leiden Mus.) from Seree Valley Camp, Snow Mts., **Neth. N. G.**, 3800 m. (*c.* 12,350 ft.), Sept. 20, 1938 (Toxopeus); the type is unique.

Measured specimen. The type.

Notes. This is obviously a different species from *fortis*, although it occurs with the latter. The single specimen is somewhat warped so that exact measurement is impossible.

Genus PLATYCOELUS Blanchard

Blanchard 1853, Voyage au Pole Sud . . . L'Astrolabe et La Zélée, Zool. **4**, p. 25, pl. (Zool.) 2, fig. 10.

Chaudoir 1871, Bull. Soc. Nat. Moscou **44**, Part 2, No. 3–4, p. 286.

Chlaenioidius Chaudoir 1865, Bull. Soc. Nat. Moscou **38**, Part 2, No. 3, p. 110 (new synonym).

Tschitschérine 1890, Horae Soc. Ent. Rossicae **25**, p. 164.

Sloane 1920, Proc. Linn. Soc. New South Wales **45**, p. 152.

Hypherpinus Straneo 1938, Mem. Soc. Ent. Italiana **16**, p. 227 (new synonym).

Dalbertisia Straneo 1939, Mem. Soc. Ent. Italiana **18**, p. 117 (new synonym).

Diagnosis. Small or medium-sized (9.7-18.0 mm.); black, shining, sometimes with elytra iridescent; usually (but not always) fully winged; ventral segments not transversely impressed; elytra with scutellar strioles present, 3rd interval not punctate; mentum tooth emarginate; and ♂ parameres long and slender (exceptional among Pterostichini).

Description. None required here; see diagnosis, above.

Genotypes. Of *Platycoelus, P. depressus* Blanchard of New Guinea (see below); of *Chlaenioidius, Feronia prolixa* Erickson of Australia (present designation); of *Hypherpinus, H. jedlickai* Straneo of the Moluccas; of *Dalbertisia, D. lucidula* Straneo (= *P. depressus*) of New Guinea.

Generic distribution. Australia, New Guinea, New Britain, Moluccas, New Caledonia; and *Psegmatopterus* Chaudoir of New Zealand is apparently closely related (Britton 1940, *Trans. R. Soc. New Zealand* **69**, p. 507).

Notes. Chaudoir made no comparison between *Chlaenioidius* and *Platycoelus*. Most of the New Guinean species ("*Platycoelus*") have a somewhat different aspect from most of the

Australian species (*"Chlaenioidius"*), but *archboldi* of New Guinea resembles Australian species, and a probably undescribed species of the New Guinean group of the genus occurs in tropical North Queensland, Australia. I can find no real generic distinction between the two groups.

Straneo distinguished *Hypherpinus* from *Chlaenioidius* by lack of basal margin of elytra in the former, but this character proves not to be of generic value. This fact is demonstrated by *Chlaenioidius* (= *Platycoelus*) *archboldi*, described below, in which the basal elytral margin varies *individually* from nearly entire (but lightly impressed) to even more obliterated than in the type of *Hypherpinus*, with which I compared specimens at the British Museum in 1947.

Straneo described *Dalbertisia* without referring to either *Platycoelus* or *Chlaenioidius*, stressing the unusual form of the ♂ parameres. They are indeed unusual, but the Australian *Chlaenioidius* has parameres of the same general nature although different in detail (*cf.* figs. 65, 66). There is no generic distinction here, so far as I can judge.

In habits, most Australian and New Guinean species of this genus occur under cover on the ground in wet places, often (but perhaps not always) beside swamps or standing water. However, I suspect that *P. depressus*, of which some individuals have atrophied wings, may inhabit leaf-litter on the ground in rain forest.

Key to Species of Platycoelus of New Guinea

1. Smaller and more compact; marginal intervals of elytra not closely punctulate; wings sometimes (not always) reduced 2
— Larger and more elongate; marginal intervals (nos. 8, 9, and marginal gutters) of elytra closely punctate; wings always fully developed ..3
2. Elytra fully striate or nearly so (p. 543) . . . . . *depressus*
— Discal elytral striae obliterated except at extreme apex (p. 544) *biroi*
3. Head closely punctulate between posterior edges of eyes; prothorax more narrowed anteriorly and less so posteriorly (base/apex 1.33 and 1.35); basal margin of elytra lightly impressed, sometimes interrupted or obsolete (p. 545) . . . . . *archboldi*
— Head not closely punctulate; prothorax relatively less narrowed anteriorly and more so posteriorly (base/apex 1.22 and 1.19); basal margin of elytra entire, joining bases of scutellar striolae (p. 547) . . . . . *major*

Platycoelus depressus Blanchard

Blanchard 1853, Voyage au Pole Sud . . . L'Astrolabe et La Zélée, Zool. **4**, p. 25, pl. (Zool.) 2, fig. 10.

Louwerens 1956, Treubia **23**, p. 221.

Dalbertisia lucidula Straneo 1939, Mem. Soc. Ent. Italiana **18**, p. 117, figs. 1–6. (new synonym).

—— 1942, Boll. Soc. Ent. Italiana **74**, p. 13.

Description. Relatively small, broad, and compact; dark, not or not strongly irideseent; prothorax transversely subquadrate, sides broadly rounded, not or at most very slightly sinuate before base; elytra with basal margin entire, striae rather lightly impressed, punctulate; inner wings dimorphic, fully developed or reduced. Proportions: head .62 and .57 width prothorax; prothoracic width/length 1.29 and 1.35, base/apex 1.26 and 1.24, base/head 1.28 and 1.36; width elytra/prothorax 1.27 and 1.26. Male copulatory organs: figure 65. *Measurements:* length 9.7-11.5; width 3.9-4.3 mm.

Types. Of *P. depressus*, from Triton Bay, S. coast of **Neth. N. G.**, at least 3 specimens now in Paris Mus.; of *D. lucidula*, from Fly R. (presumably **Papua**), in Genoa Civic Mus.

Occurrence in New Guinea. **Papua**: the holotype and additional specimens of *lucidula* recorded from the type locality by Straneo. **N-E. N. G.**: 1, Madang (Friedrich-Wilh.-hafen) 1901 (Biró, Hungarian National Mus.); 1, Aitape, Aug. 1944 (Darlington). **Neth. N. G.**: 3, Triton Bay, 1841 (Jacquinot, Hombron, and Le Guillou, Paris Mus.).

Measured specimens. A ♂, Triton Bay, and a ♂, Aitape.

Notes. The original figure of *depressus* is hardly recognizable, but the Triton Bay specimens, sent me from the Paris Mus., are presumably types of the species. They agree very well in form etc. with Straneo's figure of *Dalbertisia lucidula*. The wings are evidently reduced in Straneo's types of *lucidula*, for he gives "Alae rudimentales" as a generic character of *Dalbertisia*. They are reduced also, to about ⅔ elytral length, in at least one of the Triton Bay specimens. I have not tried to examine the wings of the other 2 Triton Bay individuals, which are old and in poor condition and might not stand relaxing. However, my Aitape individual has the inner wings fully developed and so does Biró's from Madang. Louwerens records the species from Obi Is., **Moluccas**.

I have already stated, under the genus, that I think this species probably lives among dead leaves on the ground in rain forest. My Aitape specimen was taken in a flood in rain forest country. And the beginning of wing atrophy in the species suggests that it has moved away from the association with open water characteristic of other species of the genus.

Platycoelus biroi n. sp.

Description. Rather small and compact (in genus); black, appendages a little browner; surface shining, silky or slightly iridescent; reticulate microsculpture not distinct on head and pronotum, present as fine transverse lines on elytra. *Head* .66 width prothorax; eyes less prominent than in *depressus* and more nearly enclosed by genae posteriorly; antennae rather short, middle segments less than 2X long as wide; mandibles strongly curved, acutely pointed; clypeus truncate; labrum broadly emarginate, 6-setose; front evenly convex except slightly impressed transversely between eyes, with frontal foveae only slightly and irregularly impressed; clypeal suture fine; neck constriction slight; surface of front very smooth and shining, at most faintly and sparsely punctulate; mentum with broad truncate-emarginate tooth. *Prothorax* subquadrate, a little more narrowed in front than behind; width/length 1.30; base/apex 1.19; base/head 1.16; sides broadly arcuate through most of length, not distinctly sinuate before base; base slightly, broadly emarginate at middle, and slightly rounded-oblique at sides; apex subtruncate (or very broadly emarginate, depending on angle of view) with anterior angles not advanced; base and apex not margined (except apex toward sides); side margins narrow anteriorly, becoming broader posteriorly, each with usual 2 setae about ⅓ from apex and at (just inside of) basal angle; latter blunted-obtuse; disc moderately convex with anterior and posterior transverse impressions slight, middle line fine and abbreviated both ends; baso-lateral foveae slightly impressed, vaguely linear, about midway between middle and margins of prothorax, separated from margins by slightly convex areas; surface of disc very smooth, with at most faint and sparse punctulation. *Elytra* more than ¼ wider than prothorax (E/P 1.28); greatest width behind middle; humeri moderately prominent and rather narrowly rounded, with sides behind them vaguely sinuate; basal margin entire and well impressed, rather strongly but obtusely angulate at humeri; subapical sinuations and marginal interruptions strongly developed; apices slightly damaged

but apparently conjointly rounded; striae obsolete on disc (indicated only by slight irregularities of surface), but all striae deep at extreme apex, with 7th extending forward (lightly impressed) to about middle of elytral length, and 8th entire, irregularly but rather deeply impressed, with usual foveae and some additional punctation, and 9th (marginal gutter) punctate; surface of disc very smooth. *Lower surface* virtually impunctate; prosternal process margined; metepisterna moderately long; ventral segments not transversely impressed. *Legs* without obvious noteworthy characters. *Inner wings* evidently reduced, but not examined. *Secondary sexual characters:* of ♀ normal; ♂ unknown. *Measurements:* length 12.0; width 4.5 mm.

Type. Holotype ♀ (Hungarian National Mus.) from Simbang, Huon Gulf, **N-E. N. G.**, 1898 (Biró).

Occurrence in New Guinea. Known only from the type.

Measured specimen. The type.

Notes. At first glance this new species has the appearance of a very small "apterous" *Lesticus,* but it seems to have the characters of *Platycoelus,* although I have of course not been able to compare the ♂ parameres. The species may be allied to *P. depressus,* which it somewhat resembles in form and with which it agrees closely in form of basal impressions of prothorax.

Platycoelus archboldi n. sp.

Description. A medium-large, slightly subfusiform member of the present genus; black, shining, more or less iridescent, outer segments of antennae etc. browner; reticulate microsculpture not visible on head and disc of pronotum, faint and transverse on elytra. *Head* .67 and .67 width prothorax; eyes moderately large and prominent, genae short and oblique; antennae rather slender, middle segments about 4X long as wide; mandibles arcuate and pointed as usual; clypeus and labrum broadly emarginate; front slightly, transversely impressed between posterior edges of eyes; clypeal suture almost obsolete; frontal sulci sublinear (but not sharply defined), extending onto clypeus anteriorly and almost to mid-eye level posteriorly; surface finely but densely punctulate posteriorly (between posterior parts of eyes) and outside frontal foveae, sparsely punctulate elsewhere; mentum tooth stout, emarginate. *Prothorax* subquadrate except rather strongly narrowed anteriorly, only slightly so posteriorly; width/length 1.16 and 1.11; base/apex 1.33 and 1.35; base/head 1.25 and 1.35; sides broadly arcuate through most of length, not

or faintly sinuate before base; base subtruncate, slightly sinuate and then oblique toward sides; apex very broadly emarginate but anterior angles not otherwise advanced; base not margined; apex finely margined but margin interrupted at middle; side margins moderate and uniform through *c.* 3/4 of length, much broader basally, each with usual 2 setae slightly before middle and at (slightly inside of) basal angle; basal angles blunted-obtuse; disc with transverse impressions vague, middle line well impressed but slightly abbreviated at ends; baso-lateral impressions not deeply impressed, sublinear, about midway between middle and sides of pronotum, separated from margins by slightly convex spaces, rather closely but finely and irregularly punctulate; surface of disc otherwise almost impunctate or finely punctulate, sometimes with small areas of closer punctation anteriorly each side of middle. *Elytra* about 1/3 wider than prothorax (E/P 1.30 and 1.37), subparallel at middle; anterior margins lightly impressed, sometimes interrupted or obsolete, strongly but obtusely angulate at humeri; subapical sinuations and interruptions strongly developed; apices rather narrowly conjointly rounded; striae entire, rather lightly impressed, faintly punctulate; intervals almost flat on disc, more convex at extreme apex, not punctate on disc but 8th and 9th and marginal gutter closely punctulate for whole length and all intervals closely punctulate at apex. *Inner wings* fully developed. *Lower surface:* sides of body closely punctate or punctulate; prosternal process not margined; metepisterna moderately long; ventral segments not transversely impressed. *Legs* without obvious unusual characters. *Secondary sexual characters:* ♂ with anterior tarsi slightly dilated, first 3 segments biseriately squamulose; ♂ with 1, ♀ 2 apical setae each side last ventral segment. *Measurements:* length *c.* 15-18; width 5.6-6.1 mm.

Types. Holotype ♂ (M.C.Z. No. 30,224) and 3 paratypes from Hollandia, **Neth. N. G.**, July-Sept. 1944 (Darlington). Additional paratypes: 1, Maffin Bay, **Neth. N. G.**, Aug. 1944 (Darlington); 2, Lake Daviumbu, Fly R., **Papua**, Aug. 19-30 and Sept. 1-10, 1936 (Archbold Expedition, A.M.N.H.).

Measured specimens. The ♂ holotype and 1 ♀ paratype from Hollandia.

Notes. I have 2 teneral specimens apparently referable to this species from Cape Gloucester, **New Britain**. The species somewhat resembles *Chlaenioidius* (= *Platycoelus*) *prolixus* (Erickson) of Australia (the genotype) but has the head and elytra less extensively punctulate and differs slightly in other ways.

Platycoelus major (Straneo)

Straneo 1942, Bull. Soc. Ent. Italiana **74**, p. 12 (*Dalbertisia*).

Description. Form as figured (fig. 57); rather large; black, elytra with little or no iridescence, appendages dark; prothorax subquadrate, more narrowed in front than behind, with sides not or slightly sinuate before base; elytra with basal margin entire, striae well impressed and distinctly punctulate, and intervals sometimes (not always) finely and sparsely punctulate. Proportions: head .66 and .67 width prothorax; prothoracic width/length 1.20 and 1.16 (1.21); base/apex 1.22 and 1.19 (1.11); base/head 1.24 and 1.22; width elytra/prothorax 1.17 and 1.25 (1.25). *Measurements:* length *c.* 13-16; width 4.2-5.5 mm.

Type. A ♂ from **New Guinea** without more exact locality, in Straneo collection.

Occurrence in New Guinea. **Papua**: 36, Dobodura, Mar.-July 1944 (Darlington); 8, Oro Bay, Dec. 1943-Jan. 1944 (Darlington); 1, Port Moresby area, May 1947 (L. Jones "C. 378," British Mus.); 3, Sagarai (River), Oct. 17, 1917 (J. T. Zimmer, Chicago Mus.).

Measured specimens. A pair (♂ ♀) from Dobodura; the proportions of the type are in parentheses, from measurements given by Straneo, but they should be compared with caution, for Straneo's method of measurement may be different from mine.

Notes. Found among dead leaves etc. in wet places.

Haploferonia new genus

Diagnosis. A medium-sized, flightless pterostichine, resembling a rather slender parallel-sided *Pterostichus* but with most of the technical characters of *Loxandrus*.

Description. Head of moderate size; mandibles of about average length and curvature; antennae pubescent from 4th segments; all palpi (of ♀) slender; labium with middle part broad, rounded, 2-setose, and paraglossae narrow, longer; inner lobes of maxillae strongly curved and produced at apex, with coarse curved setae along inner edge; mentum tooth entire. *Prothorax* with baso-lateral impressions linear. *Elytra* without subapical sinuations or marginal interruptions; basal margin entire, joining sutural stria at base; basal puncture at base 2nd stria; scutellar strioles absent or nearly so; 10th interval distinct in more than posterior ½ of elytral length; 3rd interval with 1

dorsal puncture, by 2nd stria slightly before middle of elytral length. *Inner wings* vestigial. *Lower surface:* prosternum not distinctly margined (but vaguely so), without setae; metepisterna with outer edge (not including posterior lobe) about as long as anterior edge; ventral segments not transversely impressed anteriorly, but with triangular impressions each side. *Legs:* middle and hind tarsi with first 3 segments lightly grooved externally, scarcely so internally; 5th tarsal segments with weak accessory setae. *Secondary sexual characters* of ♀ normal; ♂ unknown.

Genotype. Haploferonia simplex (described below).

Generic distribution. Known only from the type locality.

Notes. As indicated above, this genus has many characters of *Loxandrus* including simple mentum tooth, linear baso-lateral impressions of pronotum, obliteration of marginal interruption of the elytra (almost obliterated in some *Loxandrus*), absence of scutellar strioles, 1-punctate 3rd elytral interval, vaguely margined prosternal process, and absence of transverse impressions of ventral segments. Secondary sexual characters cannot be compared in the absence of the ♂ of *Haploferonia.* The new genus is distinguished from *Loxandrus* by presence of a distinct, convex (but incomplete) 10th elytral interval, and it is distinguished also from most *Loxandrus* by very short metepisterna and comparatively simple tarsal segments (not strongly sulcate above). However, the tarsal segments are relatively simple in *Loxandrus latus* of New Guinea. In fact *L. latus* and several Australian species assigned to *Loxandrus* seem to have begun a course of evolution that might lead to something like *Haploferonia.* That is, their wings and eyes are reduced, and some at least of them have entered the habitat where I suppose *Haploferonia* occurs: leaf-litter on the ground in rain forest. The phylogeny of the *Loxandrus-Nebrioferonia-Haploferonia* complex in Australia and New Guinea should be an interesting evolutionary problem.

Haploferonia simplex n. sp.

Description. Form (fig. 58) as described under genus; black, rather shining, elytra at most faintly iridescent, appendages reddish piceous; reticulate microsculpture fine and almost isodiametric on head, faint and transverse on pronotum, more distinct and transverse on elytra. *Head* .73 width prothorax; eyes not large, scarcely more prominent than genae, latter slightly

rounded-oblique and nearly long as eyes; antennae of moderate length, middle segments less than 3X long as wide; front slightly almost evenly convex except for frontal impressions; latter rather short, shallow, poorly defined, subparallel; clypeal suture fine; neck depression slight; 2 supraocular setae each side. *Prothorax* rather long, subquadrate; width/length 1.09; base/apex 1.09; base/head 1.09; sides slightly and almost evenly arcuate for whole length; base broadly emarginate at middle, rounded oblique at sides, margined only at sides; apex subtruncate or very broadly emarginate with anterior angles scarcely advanced, apex margined only at sides; side margins narrow, slightly broader posteriorly, each with usual 2 setae about ⅓ from apex and on (position of) basal angle; basal angles rather narrowly rounded; disc rather convex; transverse impressions weak; middle line fine, virtually obliterated at both ends; baso-lateral impressions linear but not much impressed, mid-way between middle line and margins, ⅓ or more length pronotum, vaguely punctate; disc otherwise virtually impunctate. *Elytra* about ⅕ wider than prothorax (E/P 1.21) sides subparallel except slightly arcuate; basal margin angulate at humeri; subapical sinuations and marginal interruptions virtually absent; striae entire, deeply impressed, not or faintly punctulate; intervals convex on disc, more so apically and laterally. *Lower surface:* sides of body punctate, proepisterna least so. *Inner wings* evidently vestigial, but not examined in the single specimen. *Legs* of about average length for group; tarsi as described in generic description. *Secondary sexual characters* (♀) normal. *Measurements:* length 12.8; width 4.0 mm.

Type. Holotype ♀ (Leiden Mus.) from mountain slope above Bernhard Camp, **Neth. N. G.**, 750 m. (*c.* 2450 ft.), Mar. 1939 (Toxopeus).

Measured specimen. The type.

Notes. The habitat of this species is not recorded, but I think it probably lives on the ground in middle-altitude rain forest.

Genus Loxandrus Leconte

Leconte 1852, J. Acad. Nat. Sci. Philadelphia (2) **2**, p. 250.

Sloane 1903, Proc. Linn. Soc. New South Wales **28**, p. 625 (key to Australian species).

—— 1920, Proc. Linn. Soc. New South Wales **45**, p. 152.

Csiki 1930, Coleop. Cat., Carabidae, Harpalinae **4**, p. 569 (see for additional references and synonymy).

Diagnosis. Small or medium-sized (6.4-11.0 mm. in New Guinea) Pterostichini; color usually dark and strongly iridescent; mentum tooth entire (not emarginate as in *Platycoelus*); pronotum with anterior margin entire or nearly so, posterior margin lacking (in New Guinean species); elytra with submarginal interruption rather weak; scutellar strioles absent; 10th interval not distinct; 3rd interval 1-punctate; wings usually fully developed, but dimorphic in *latus;* middle and hind tarsi variably suleate (or costate) above (see notes under *Nebriofer-onia,* p. 557), 5th tarsal segments with (more or less well developed) accessory setae (in New Guinean species); dilated segments ♂ anterior tarsi oblique.

Description. None required here.

Genotype. Probably not designated. Should be selected by next reviser from among the American species originally mentioned by Leconte.

Generic distribution. Australia, New Guinea, Celebes; and much of South, Central, and eastern North America north to about the southern border of Canada.

Notes. A possible geographical history of *Loxandrus* has been suggested in discussion under the tribe. The Australian and American species are very similar, probably related, and probably relics of a once more-widely distributed group. But further study is needed to determine the degree of their relationship.

Most species of this genus in both Australia and America live in swamps or vegetation floating in still water, but a few Australian species have entered other habitats. For example, *L. longiformis* Sloane occurs among cobble stones and gravel by running water, and several Australian species have left the water and live on the ground in rain forest or mountain forest. In some of these Australian species the wings have atrophied and the eyes are reduced in prominence. In New Guinea, all known species of the genus (except possibly *latus*) live among leaves etc. in very wet places, usually in or beside swamps or pools, but *L. latus* is apparently evolving in the direction of the Australian flightless mesophile species.

Loxandrus has not previously been reported from New Guinea, although several species occur there, but a species is described from Celebes (*L. celebensis* Bates 1871, *Ent. Month. Mag.* **8**, p. 133).

Key to Species of Loxandrus of New Guinea

1. Posterior-lateral prothoracic setae lacking; broad, with relatively small head (head *c.* .56 width prothorax); wings dimorphic (p. 551) . *latus*
— Posterior-lateral prothoracic setae present; more slender, with relatively larger head (head *c.* .64 to .72 width prothorax); wings fully developed 2
2. Prothorax with posterior angles well defined, almost right, scarcely blunted; small (6.4–7.0 mm.) (p. 552) . . . . . *subrectus*
— Prothorax with posterior angles broadly blunted-obtuse or rounded; larger (7–11 mm.) 3
3. Larger (9½–11 mm.) (p. 554) . . . . . *major*
— Smaller (7½–9½ mm.) (p. 555) . . . . . *medius*

LOXANDRUS LATUS n. sp.

Description. Medium-sized, broad; black, rather weakly iridescent, appendages brownish black; reticulate microsculpture fine and isodiametric on head, not visible on pronotum, present as extremely fine transverse lines on elytra. *Head* .56 and .56 width prothorax; eyes moderately prominent, genae oblique; antennae less slender than in following species, middle segments about 3X long as wide; front nearly evenly convex (sometimes slightly impressed at middle); frontal foveae short and shallow; neck constriction obsolete; mentum tooth entire. *Prothorax* broad, rounded; width/length 1.40 and 1.33; base/apex 1.21 and 1.12; base/head 1.30 and 1.30; sides broadly rounded throughout; base subtruncate or very broadly emarginate at middle, slightly rounded-oblique at sides, not margined except sometimes vaguely at extreme sides; apex rather deeply emarginate (so that angles are rather strongly advanced as a result of the emargination but not otherwise), finely margined; side margins narrow, but sides of pronotum depressed in about basal ⅖; each margin with anterior-lateral seta about ⅖ from apex, but posterior-lateral setae lacking; basal angles broadly rounded or broadly blunted-obtuse; disc convex; transverse impressions virtually obsolete; middle line fine, slightly abbreviated at both ends; basal foveae linear, about midway between middle line and margin, ⅓ (more or less) long as pronotum, irregularly punctate, as are areas between basal foveae and margins; disc otherwise virtually impunctate. *Elytra* shorter than usual, about ⅕ or more wider than prothorax (E/P 1.20 and 1.23), parallel-sided, with normal subapical sinuations and with marginal interruptions stronger than in other species; basal margins entire,

obtusely angulate at humeri; apices conjointly rounded; striae rather deeply impressed and plainly punctulate; intervals moderately convex, deeper apically and laterally, 3rd with 1 dorsal puncture by 2nd stria about middle of length. *Inner wings* dimorphic: fully developed in 2 (♂ ♀) from Dobodura and the 1 from Paumomu River, reduced to ½ or slightly more elytral length in 8 (both sexes) from Dobodura. *Lower surface:* sides of body extensively but rather irregularly punctate; prosternal process not margined; metepisterna moderately long; ventral segments not transversely impressed. *Legs* without obvious unusual special characters; middle and hind tarsi sulcate each side above, but sulci narrower than in other species, deeper on outer than on inner side; 5th segments with fine accessory setae. *Secondary sexual characters* normal; ♂ front tarsi dilated, dilated segments oblique, first 3 biseriately squamulose; ♂ with 1, ♀ 2 setae each side last ventral segment. *Measurements:* length 7.5-8.7; width 3.0-3.4 mm.

Types. Holotype ♂ (M.C.Z. No. 30,225) and 9 paratypes from Dobodura, **Papua**, Mar.-July 1944 (Darlington); 1 paratype, Paumomu R., **Papua**, Sept.-Dec. 1892 (L. Loria, Straneo Coll.).

Measured specimens. The ♂ holotype and 1 ♀ paratype from Dobodura.

Notes. The relatively broad form distinguishes this species from all other New Guinean and (I think) all Australian *Loxandrus* and gives it a superficial resemblance to *Platycoelus depressus*. I do not know its habits; its form and state of wings suggest that it *may* live in leaf litter on the ground in rain forest rather than in wet places.

Loxandrus subrectus n. sp.

Description. Small; about average form (fig. 59) and convexity for genus; dark, moderately iridescent, appendages brown; reticulate microsculpture distinct, fine, isodiametric on head, indistinct (presumably very fine and transverse where present) on pronotum and elytra. *Head* .71 and .72 width prothorax; eyes large and prominent (in genus), genae short and oblique; antennae slender, median segments about 4X long as wide; front moderately convex, sometimes with 1 or 3 slight impressions near middle; frontal foveae weakly impressed, short; neck constriction scarcely indicated; mentum tooth entire. *Prothorax* subquadrate except more narrowed in front than behind;

width/length 1.26 and 1.28; base/apex 1.26 and 1.22; base/head 1.19 and 1.16; sides broadly arcuate anteriorly, straight and converging and usually slightly sinuate to base; base subtruncate or slightly emarginate at middle, slightly oblique at sides, not distinctly margined; apex broadly emarginate (but anterior angles not otherwise advanced), margined; lateral margins moderate except much broader at base, punctate especially basally, each with usual 2 setae about ⅓ from apex and at basal angle; basal angles almost right (slightly obtuse), scarcely blunted; disc with transverse impressions virtually obsolete, middle line fine, more or less abbreviated at ends; baso-lateral foveae linear, about midway between middle and sides of prothorax, about ⅖ long as latter; disc impunctate or nearly so except variably (individually) punctate between baso-lateral foveae and lateral margins at base. *Elytra* about ⅖ wider than prothorax (E/P 1.41 and 1.38), sides parallel, sometimes faintly sinuate before middle; subapical sinuations weak, marginal interruptions very weak; margin entire at base, obtusely angulate at humeri; striae well impressed, not distinctly punctulate; intervals moderately convex on disc, more so apically and laterally, 3rd with 1 dorsal puncture by 2nd stria near middle of length. *Inner wings* fully developed. *Lower surface:* extensively punctate at sides; prosternal process vaguely or not margined; metepisterna rather long; ventral segments not transversely impressed. *Legs* without obvious unusual characters; middle and hind tarsi deeply and broadly sulcate each side above (2-sulcate, 3-costate); 5th segments with a few weak accessory setae. *Secondary sexual characters* normal: ♂ with anterior tarsi dilated, dilated segments oblique, first 3 biseriately squamulose; ♂ with 1, ♀ 2 setae each side last ventral segment. *Measurements:* length 6.4-7.0; width 2.3-2.6 mm.

Types. Holotype ♂ (M.C.Z. No. 30,226) and 9 paratypes from Dobodura, Papua, Mar.-July 1944 (Darlington); and 4 paratypes from Oro Bay (near Dobodura), Dec. 1943-Jan. 1944 (Darlington).

Measured specimens. The ♂ holotype and 1 ♀ paratype from Dobodura.

Notes. The rather small size and especially the posterior prothoracic angles (well formed and nearly right) distinguish this species from others in New Guinea and also, I think, from all Australian species.

Loxandrus major n. sp.

Description. Large; about average form and convexity for genus; black, iridescent above, appendages dark (piceous to brown); reticulate microsculpture fine and isodiametric on front, faint (scarcely visible at 100X) and strongly transverse on pronotum and elytra. *Head* .66 and .67 width prothorax; eyes moderately prominent, genae oblique; antennae slender, middle segments about 4X long as wide; front almost evenly convex except for vague neck constriction and weakly impressed, irregular frontal foveae, indistinctly punctulate; mentum tooth rounded-truncate at apex. *Prothorax* rounded-subquadrate; width/length 1.19 and 1.31 (unusually variable); base/apex *c* 1.00 and 1.03; base/head 1.03 and 1.06; sides broadly arcuate through whole length or straighter posteriorly, usually not sinuate; base broadly emarginate, rounded toward sides, not distinctly margined; apex broadly emarginate (but anterior angles not otherwise advanced), finely margined, margin sometimes interrupted at middle; side margins moderate anteriorly, somewhat broader in posterior ½, each with usual 2 setae about ⅓ from apex and at position of (rounded) posterior angle; posterior angles slightly variable, broadly rounded or vaguely obtuse; disc rather weakly convex, with usual vague transverse impressions and finely impressed middle line abbreviated at ends; baso-lateral foveae linear, lightly impressed, about midway between middle and sides of pronotum, about ⅓ long as latter; surface of pronotum variably punctate across base (punctures usually rather sparse but obvious, but sometimes almost absent) and apex; other parts of disc impunctate or nearly so. *Elytra* ¼ wider than prothorax (E/P 1.27 and 1.27), parallel sided; subapical sinuations of margins moderate, marginal interruptions rather weak; anterior margins entire, strongly impressed, obtusely angulate at humeri; striae entire, moderately impressed, not or faintly punctulate; intervals slightly convex on disc, more so apically, 3rd with 1 dorsal puncture near 2nd stria about middle of length. *Inner wings* fully developed. *Lower surface:* sides of body extensively punctate; prosternal process margined; metepisterna moderately long; ventral segments not transversely impressed. *Legs* without obvious noteworthy characters; posterior tarsi deeply and broadly sulcate each side above (2-sulcate or 3-costate); 5th tarsal segments with weak accessory setae. *Secondary sexual characters* normal: ♂ with anterior tarsi dilated, dilated segments oblique, first 3 with biseriate squamae as

usual; ♂ with 1, ♀ 2 setae each side last ventral segment. *Measurements:* length 9½-11; width 3.5-4.1 mm.

Types. Holotype ♂ (M.C.Z. No. 30,227) and 3 paratypes from Hollandia, **Neth. N. G.**, July-Sept. 1944 (Darlington). Additional paratypes from **Papua** as follows: 4, Palmer R. at Black R., June 15-22, 1936 (Archbold Expedition, A.M.N.H.); 16, Lake Daviumbu, Fly R., Aug. 19-30, Sept. 11-20 and 21-30, 1936 (Archbold Expedition, A.M.N.H.).

Measured specimens. The ♂ holotype and 1 ♀ paratype from Hollandia.

Notes. This new species is somewhat similar to one from North Queensland, Australia, that I identify tentatively as *laevigatus* Macleay (*sensu* Sloane 1903), but the New Guinean species has the prothorax somewhat more broadly rounded, and its base is not margined as it is in the Australian one. I should add that the Australian species of *Loxandrus* are very much in need of revision, and that the real relationship of the New Guinean species cannot be settled until the Australian ones are put in order.

Loxandrus medius n. sp.

Description. Form as figured (fig. 60); medium-sized, rather slender; black or brownish black, moderately iridescent, appendages varying from piceous to brownish yellow; reticulate microsculpture distinct and isodiametric on front of head, not distinguishable on pronotum, scarcely so except as very fine transverse lines on elytra. *Head* .64 and .66 width prothorax; eyes moderately prominent, genae oblique; antennae rather slender, median segments about 4X long as wide; front normally convex, sometimes slightly impressed anteriorly; frontal foveae shallow, short; neck constriction vague; mentum tooth entire. *Prothorax* rounded-subquadrate; width/length 1.23 and 1.31; base/apex 1.09 and 1.06; base/head 1.09 and 1.08; sides broadly arcuate through all or most of length, not sinuate; base truncate or faintly emarginate at middle, rounded-oblique at sides, not margined; apex broadly emarginate (but anterior angles not otherwise advanced), finely margined, margin very fine or partly obliterated at middle; lateral margins moderate anteriorly, much broader in basal ⅓, punctate especially posteriorly, each with usual 2 setae about ⅓ from apex and at (position of) basal angle; basal angles blunted-obtuse or rounded (somewhat variable); disc moderately convex; transverse impressions virtually

obsolete; middle line fine, abbreviated at ends; basal foveae linear but not sharply defined, about midway between middle and sides of pronotum and ⅓ or more long as latter, punctate; and adjacent parts of base of pronotum sometimes (not always) variably punctate; pronotum otherwise impunctate or nearly so. *Elytra* ⅕ or ¼ wider than prothorax (E/P 1.20 and 1.26); anterior margin entire, rather strongly but obtusely angulate at humeri; sides subparallel, subapical sinuations moderate, marginal interruptions rather weak; apices narrowly irregularly blunted or rounded; striae well impressed, faintly or distinctly punctulate; intervals moderately convex, deeper at sides and apex; 3rd interval 1-punctate by 2nd stria near or before middle of length. *Inner wings* fully developed. *Lower surface:* sides of body below punctate but rather variably so (proepisterna sometimes almost impunctate); prosternal process usually margined (but margin sometimes vague); metepisterna moderately long; ventral segments not transversely impressed. *Legs* without obvious unusual characters; middle and hind tarsi strongly broadly sulcate each side above (2-sulcate) or vaguely 4-sulcate; 5th segments with weak accessory setae. *Secondary sexual characters* normal: ♂ front tarsi dilated, dilated segments oblique, biseriately squamulose; ♂ with 1, ♀ 2 setae each side last ventral segment. Male copulatory organs: figure 67. *Measurements:* length *c.* 7-9½; width 2.8-3.4 mm.

Types. Holotype ♂ (M.C.Z. No. 30,228) and 45 paratypes from Dobodura, **Papua**, Mar.-July 1944 (Darlington). Additional paratypes as follows. **Papua**: 5, Oro Bay, Dec. 1943-Jan. 1944 (Darlington); 1, Sagarai (River), Oct. 17, 1917 (J. T. Zimmer, Chicago Mus.). **N-E. N. G.**: 4, Aitape, Aug. 1944 (Darlington). **Neth. N. G.**: 37, Hollandia, July-Sept. 1944 (Darlington); 13 Maffin Bay, Aug. 1944 (Darlington); 72, Sansapor (Vogelkop) Aug. 1944 (Darlington); 1, Bernhard Camp, 50 m. (*c.* 150 ft.), July-Sept. 1938 (J. Olthof, Leiden Mus.).

Additional material. **Papua**: 1, Rigo, July 1889 (L. Loria, Straneo Coll.); this specimen is very small, with prothorax broader than usual; I assign it to the present species, but with doubt.

Measured specimens. The ♂ holotype and 1 ♀ paratype from Dobodura.

Notes. This common and somewhat variable species is similar to *L. celebensis* Bates which, however, has a broader prothorax with less punctate base of pronotum. I have examined three specimens of *celebensis* from "Celebes" in the British Museum

and 2 additional specimens labeled "Dory, New Guinea," but this latter locality is doubtful (see p. 331) and I see no reason to list the species from New Guinea even tentatively. The "Dory" specimens agree with the examples from Celebes and not with those from Sansapor. This species is probably allied also to certain Australian ones, but in the present state of chaos of the Australian species I cannot find an Australian name to use for it.

Genus Nebrioferonia Straneo

Straneo 1939, Mem. Soc. Ent. Italiana **18**, p. 119.

Diagnosis. Medium-sized (as large as or larger than largest *Loxandrus*), winged Pterostichini; black or brownish black, dull, or shining and iridescent, appendages dark brown to yellowish; prothorax strongly cordate; other external characters almost as in *Loxandrus: i. e.* mentum tooth entire; baso-lateral impressions or pronotum single and linear; elytra with subapical marginal interruptions weak or almost obsolete (weak in some *Loxandrus, e.g. major*), without scutellar striae, 3rd intervals 1-punctate; first 3 segments middle and hind tarsi 2- or 4-sulcate (3- or 5-costate) above (see following notes); 5th tarsal segments with weak accessory setae; dilated segments ♂ front tarsi oblique.

Description. See Straneo 1939.

Genotype. Nebrioferonia strigitarsis Straneo (below).

Generic distribution. Widely distributed in New Guinea; unknown elsewhere.

Notes. So far as I can find, the only real difference between this genus and the New Guinean species of *Loxandrus* is in form of prothorax, strongly cordate in *Nebrioferonia.* The genotype of this genus is much duller than usual in *Loxandrus* (dull *Loxandrus* occur in America), but *Nebrioferonia straneoi* (described below) is shining and iridescent with microsculpture as usual in *Loxandrus.* The subapical interruptions of elytral margins are notably weak in *Nebrioferonia* (especially in *straneoi*) but are weak also in some *Loxandrus.* The first 3 segments of middle and hind tarsi are 4-sulcate (5-costate) above in *N. strigitarsis:* broadly 2-sulcate (3-costate) in *N. straneoi;* variable in *Loxandrus. Loxandrus medius* has these tarsal segments broadly 2-sulcate or vaguely 4-sulcate and therefore approaches the condition in *Nebrioferonia strigitarsis. Loxandrus major* and *subrectus* have these segments broadly 2-sulcate (3-costate), like *Nebrioferonia straneoi.* And *Loxandrus latus* has the segments

narrowly grooved or margined at sides, with middle part of each segment almost evenly convex, not costate as in the other species.

N. strigitarsis lives in cobblestone and gravel banks and bars of large streams. The habits of *N. strancoi* are unrecorded.

Key to Species of Nebrioferonia

1. Elytra less shining, with reticulate microsculpture of isodiametric or weakly transverse meshes (p. 558) . . . . . *strigitarsis*
— Elytra very shining and iridescent, with microsculpture (as seen at 50X or 100X) of very fine, close-set transverse lines rather than distinct meshes (p. 559) . . . . . *strancoi*

Nebrioferonia strigitarsis Straneo

Straneo 1939, Mem. Soc. Ent. Italiana **18**, p. 119, figs. 7–12.

Description. See Straneo's description and figures. This species superficially resembles *Nebria picicornis* Fabricius of Europe, as Straneo says. Proportions: head .74, .79, .81 width prothorax; prothoracic width/length 1.25, 1.30, 1.30, base/apex .97, .95, .97, base/head .95, .90, .90; width elytra/prothorax 1.36, 1.42, 1.46. Male copulatory organs: figure 68. *Measurements:* length *c.* 14-16½; width 4.8-5.9 mm.

Types. Holotype (Genoa Civic Mus.) and paratypes from Haveri, S-E. New Guinea (presumably **Papua**), collected by Loria. Paratypes said to be in Straneo and Andrewes collections and in Deutsches Ent. Institut, and one (received from Straneo) now in M.C.Z. (Type No. 30,229).

Occurrence in New Guinea. **Papua**: Haveri (the types); 11, Dobodura, Mar.-July 1944 (Darlington); 5, Oro Bay, Dec. 1943-Jan. 1944 (Darlington); 3, Kokoda, 1200 ft., Aug. 1933 (Cheesman). **N-E. N. G.**: 11, Nadzab, July 1944 (Darlington); 1, Mons Oertzen, 1897 (Biró, Hungarian National Mus.); 1, Owen Stanley Range, Goilala: Loloipa, Dec. 21-31, 1957 (W. W. Brandt, Bishop Mus.). **Neth. N. G.**: 2, Hollandia, May 1945 (Malkin, U.S.N.M); 1, same locality, May 1945 (Hoogstraal, M.C.Z.); 4, Hollandia area, W. Sentani, Cyclops Mts., 50-100 m. (*c.* 150-325 ft.), June 22-24, 1959 (J. L. Gressitt, Bishop Mus.) taken in light trap.

Measured specimens. A pair (♂ ♀) from Dobodura and a ♀ paratype (M.C.Z.) from Haveri, in this order.

Notes. I found this species only in cobblestone and gravel banks and bars of rivers (not small brooks). This habitat is different from that of most *Loxandrus*, but like that of *L. longiformis* Sloane of Australia. But I doubt if the similarity of

habits indicates direct relationship between *Nebrioferonia* and *Loxandrus longiformis*. More likely 2 different stocks of *Loxandrus* have entered the river-bar habitat independently.

N. strigitarsis may vary geographically, but more material is needed to show whether or not subspecies can be recognized.

Nebrioferonia straneoi n. sp.

Description. Form (fig. 61) nearly as in *Nebrioferonia strigitarsis*, with cordate prothorax; appendages slender; surface shining, irideseent as in *Loxandrus;* brownish black, appendages dark reddish, outer parts of antennae brown; reticulate microsculpture distinct and of small isodiametric meshes on head, faint (fragmentary) on pronotum, of very fine close transverse lines on elytra. *Head* .74 and .77 width prothorax; eyes rather small; genae oblique, about long as eyes; antennae slender, middle segments (not including pubescence) more than 4X long as wide, mandibles moderately long, curved, acute; 2 supraocular setae each side; front moderately convex; neck slightly but broadly impressed; frontal foveae short, shallow, not sharply defined; mentum tooth entire. *Prothorax* cordate; width/length 1.18 and 1.22; base/apex .99 and 1.00; base/head .95 and .94; sides broadly arcuate in about anterior ¾, broadly sinuate before base; base subtruncate or broadly emarginate, slightly rounded-oblique at sides, vaguely margined; apex broadly emarginate, with anterior angles slightly advanced beyond arc of emargination; apex margined at sides but not distinctly so at middle; reflexed side margins rather broad and nearly even throughout, each with usual 2 setae about ⅓ from apex and at basal angle; basal angles sharply defined, right or slightly obtuse; disc moderately convex; transverse impressions almost obsolete; middle line fine, abbreviated at ends; baso-lateral impressions vaguely linear (but not sharply separated from depressed baso-lateral areas of pronotum), nearer margins than middle, about ⅖ length of pronotum; basal area and sides of pronotum behind middle irregularly punctate. *Elytra* much wider than prothorax (E/P 1.48 and 1.55), subparallel at middle, with subapical sinuations weak and marginal interruptions almost obsolete; humeri rounded-prominent; anterior margins entire, weakly angulate at humeri; striae entire, moderately impressed, not distinctly punctulate; intervals slightly convex, 3rd 1-punctate by 2nd stria about middle of elytral length. *Inner wings* fully developed. *Lower surface:* meso- and metepisterna

and sides of first three ventral segments punctate or roughened, proepisterna and other ventral segments not or less so; prosternal process without setae, not distinctly margined; metepisterna rather long; ventral segments not transversely impressed. *Legs* slender but without other obvious unusual characters; 5th tarsal segments with a few small, weak accessory setae (sometimes broken off); middle and hind tarsi broadly sulcate each side and roughened above; 4th segment hind tarsi emarginate but not lobed. *Secondary sexual characters* normal: ♂ with anterior tarsi dilated, dilated segments oblique, first 3 biseriately squamulose; ♂ with 1, ♀ 2 setae each side last ventral segment. Male copulatory organs: figure 69. *Measurements:* length *c.* 12-13; width 4.4-4.7 mm.

Types. Holotype ♂ (Leiden Mus.) and 2 (♂ ♀) paratypes from Rattan Camp, Snow Mts., **Neth. N. G.**, 1200 m. (*c.* 3900 ft.), Feb.-Mar. 1939 (Toxopeus); the ♂ paratype is now in the M.C.Z. (Type No. 30,230). Also 1 ♀ paratype from Kokoda, **Papua**, 1200 ft., July 1933 (Cheesman, British Mus.).

Occurrence in New Guinea. Known only from the types.

Measured specimens. The ♂ holotype and ♀ paratype from Rattan Camp.

Notes. Although this insect vaguely resembles some species of "*Colpodes*" and although it has virtually lost the interruption of the outer margin of the elytron, other characters leave no doubt that it is a pterostichine, and I find no good reason to distinguish it from *Nebrioferonia*, which in turn, as I have said, seems closely allied to *Loxandrus*.

The habitat of the present species is not recorded but is most likely beside running water.

Tiferonia new genus

Diagnosis. A very small, winged pterostichine, characterized as indicated in the key to genera (p. 499); in general the characters seem to be those of a minute *Loxandrus* but without dorsal puncture on 3rd elytral interval and with ♂ tarsi only narrowly dilated.

Description. Head small; mandibles rather long, curved, acute, without setae in scrobes; antennae with 2nd segment not asymmetrically inserted in 1st; antennae pubescent from 4th segment; all palpi slender and pointed in both sexes; labium 2-setose; paraglossae rather wide (but narrower than middle part of labium) and long; inner lobe of maxilla curved at tip, ciliate

on inner side; mentum tooth narrow, not emarginate. *Prothorax* with basal impressions linear. *Elytra* with slight subapical sinuations and strong subapical interruptions of margin; basal margin entire, joining bases of sutural striae, angulate but not dentate at humeri; margins not serrate; basal punctures just inside bases of 2nd striae; scutellar strioles absent; 9th stria not distinguishable from marginal channel; 3rd interval impunctate. *Lower surface:* prosternal process not margined, without setae, its posterior declivity rounded; metepisterna rather long; ventral segments not transversely impressed. *Legs:* tarsi not sulcate (or at most lightly or faintly so) at sides above; 5th segments with accessory setae. *Secondary sexual characters:* ♂ front tarsi only slightly dilated (segments 2 and 3 slightly longer than wide), the segments not obviously asymmetrical but possibly derived from a wider asymmetrical form, the first 3 segments biseriately squamulose; ♂ with 1, ♀ 2 setae each side last ventral segment.

Genotype. Tiferonia parva (described below).

Generic distribution. New Guinea and the Philippines (will probably be found also in the Moluccas and Celebes, but not yet recorded from there).

Notes. This new genus is surprisingly similar, superficially, to *Tachys serra* (p. 405), but of course there is no direct relationship. The new genus is also superficially similar to *Melanochrous* (*Patellus*) of southeastern Asia and the western part of the Malay Archipelago. However it differs from *Melanochrous* in having the ♂ tarsi biseriately squamulose (not densely pubescent) below and in having linear (rather than indefinitely defined) baso-lateral pronotal impressions. The Philippine species of the present genus (I have a series from Leyte Is.) differs from the New Guinean one in having only one supraocular seta each side. This Philippine species has been described by Jedlicka (1935, *Acta Soc. Ent. Czechoslovakia* **32**, p. 108) as *Fouquetius brunneus.* However, this species and the one now being discussed from New Guinea do not seem to be true *Fouquetius.* The latter genus, which occurs in tropical Asia and Africa, has dentate humeri and serrate elytral margins, which the species now under consideration do not. They may (or may not) be relatives of *Fouquetius.* And they may (or may not) be derivatives of *Loxandrus.* If they are, they are distinguished by very small size, narrow ♂ tarsi, and lack of puncture on 3rd elytral interval. The habitat of the new genus is like that of most *Loxandrus:* wet shady places near water.

Tiferonia parva n. sp.

Description. Form (fig. 62) as described under genus; irregularly reddish piceous, appendages testaceous; rather shining, elytra slightly iridescent; reticulate microsculpture distinct and isodiametric on front, indistinguishable (or just visible as faint transverse meshes) on pronotum; indistinguishable (probably reduced to very fine close-set scratches) on elytra. *Head* .57 and .58 width prothorax; eyes of moderate size and prominence; genae about long as eyes, oblique; antennae rather stout, middle segments about 1½X long as wide; front irregularly convex; frontal foveae short, linear, irregular, curving outward posteriorly and ending about mid-eye level; clypeal suture fine; neck constriction obsolete; 2 supraocular setae each side. *Prothorax* transversely subquadrate except strongly narrowed anteriorly, scarcely so posteriorly; width/length 1.28 and 1.33; base/apex 1.51 and 1.54; base/head 1.64 and 1.63; sides rounded anteriorly, nearly straight and slightly converging posteriorly; base subtruncate, slightly oblique toward sides; apex subtruncate at middle, anterior angles slightly advanced; base not margined, apex margined at sides but margin rather widely interrupted at middle; side margins rather narrow anteriorly, vaguely merging with slightly depressed sides of disc posteriorly, each with usual 2 setae about ⅓ from apex and at basal angle; basal angles almost right (slightly obtuse), minutely blunted or subdenticulate; disc strongly convex; transverse impressions almost obsolete; middle line fine, abbreviated at both ends; basolateral impressions deep, linear, slightly nearer middle than margins, about ⅓ long as pronotum; disc impunctate. *Elytra* about ¼ wider than prothorax (E/P 1.27 and 1.25), subquadrate, with sides slightly sinuate behind humeri; apices between independently and conjointly rounded; humeri prominent, with margin rectangularly angulate; striae entire, well impressed, finely punctulate. *Inner wings* fully developed. *Lower surface* as described under genus; metepisterna and sides of metasternum and first ventral segment irregularly punctate, but lower surface otherwise virtually impunctate. *Legs* as described under genus; without obvious unusual characters. *Secondary sexual characters* as described under genus. Male copulatory organs: figure 70. *Measurements:* length *c.* 4.0-4.5; width 1.7-1.9 mm.

Types. Holotype ♂ (M.C.Z. No. 30,231) and 18 paratypes from Aitape, **N-E. N. G.**, Aug. 1944 (Darlington). Additional paratypes as follows: **Papua**: 2, Dobodura, Mar.-July 1944

(Darlington); **Neth. N. G.**: 7, Hollandia, July-Sept. 1944 (Darlington).

Measured specimens. The ♂ holotype and 1 ♀ paratype from Aitape.

Notes. For the similarities and possible relationships of this species see notes under the genus. It occurred in damp ground or debris on the ground, usually by water, in shady places, in the same habitat as the superficially similar *Tachys serra*. Some *Loxandrus* occurred in this habitat too.

Genus CATADROMUS Macleay

Macleay 1825, Annulosa Javanica, p. 18.
Tschitschérine 1896, Annuaire Mus. Zool. Acad. Sci. St. Petersburg **1**, p. 144.
Csiki 1930, Coleop. Cat., Carabidae, Harpalinae **4**, p. 737 (see for additional references).

Diagnosis. Very large Carabidae (47-56 mm. in New Guinea); subparallel; black with green margins; winged; characterized technically by four segments each antenna glabrous; etc.

Description. None needed here. See Tschitschérine 1896.

Genotype. Carabus tenebroides Olivier of Java, Australia, etc.

Generic distribution. Recorded from Australia, the Moluccas, New Guinea, Java, and Singapore.

Notes. See notes under following species.

CATADROMUS TENEBROIDES (Olivier)

Olivier 1790, Encyclopedie Methodique **5**, p. 324 (*Carabus*).
Tschitschérine 1896, Annuaire Mus. Zool. Acad. Sci. St. Petersburg **1**, pp. 144, 147.
Sloane 1920, Proc. Linn. Soc. New South Wales **45**, p. 321.
Andrewes 1921, Trans. Ent. Soc. London **1921**, p. 175.
Csiki 1930, Coleop. Cat., Carabidae, Harpalinae **4**, p. 737 (see for additional references and synonymy).
rajah Wiedeman 1824, Analecta Ent., p. 7 (*Harpalus*).
Andrewes 1921, Trans. Ent. Soc. London **1921**, p. 175.

Description. None needed here. This is the only species of the genus known in New Guinea. Proportions of New Guinean specimens: head .80 and .69 width prothorax; prothoracic width/length 1.21 and 1.23, base/apex 1.13 and 1.32, base/head 1.01 and 1.19; width elytra/prothorax 1.22 and 1.19. *Measurements* (of 2 individuals listed below): 47 x 14.4, 56 x 16.7 mm.

Types. Of *tenebroides*, presumed lost or destroyed; of *rajah*, in the Copenhagen University Zool. Mus.; both types were from Java.

Occurrence in New Guinea. **Papua**: 1, Oro Bay, Feb.-May (P. L. Horton, A.M.N.H.). **Neth. N. G.**: 1, Hollandia, Jan. 1945 (B. Malkin, Malkin Coll.).

Measured specimens. The 2 listed above.

Notes. Sloane says that he compared specimens from Australia and Java without being able to differentiate them, and gives the range of the species as Australia, Java, and Amboyna. Andrewes says he has no doubt that *rajah* is identical with *tenebroides*. The two are kept separate in the *Coleop. Cat.*, but it seems to me that they are in fact one species, which occurs in eastern Australia, New Guinea, the Moluccas (Amboyna), and Java, although I am not sure it is native in all these places. It is curious that this large and striking insect has been collected only twice in New Guinea, both times at localities where military traffic was heavy. Species of this genus frequently fly to light in Australia, and occasional specimens of the present one may have been attracted onto lighted boats in Australian ports and then onto shore again to lighted camps in New Guinea.

The Oro Bay specimen is somewhat smaller and narrower than usual in this species, with relatively large head and narrow prothoracic base, but I think it is probably an individual variant. The Hollandia specimen agrees well with those from Java.

PLATES

PLATE 11[1]

Fig. 1. *Pseudozaena orientalis opaca* (Chaudoir), ♂, central plains of Luzon, Philippine Islands.

Fig. 2. *Geoscaptus cacus* (Macleay), Dobodura.

Fig. 3. *Syleter papua* new species, paratype, Dobodura.

Fig. 4. *Clivina toxopei* new species, holotype.

Fig. 5. *Clivina kulti* new species, paratype.

Fig. 6. *Clivina puncticeps* new species, paratype, Hollandia.

Fig. 7. *Clivina deälata brachyptera* new species and subspecies, paratype.

Fig. 8. Outline of clypeus and left side of head of *Clivina toxopei* new species, holotype.

Fig. 9. Same of *Clivina kulti* new species, paratype.

Fig. 10. Same of *Clivina biroi* Kult, Dobodura.

Fig. 11. Same of *Clivina komáreki* Kult, Hollandia.

Fig. 12. Same of *Clivina brevicornis* new species, holotype.

Fig. 13. Same of *Clivina puncticeps* new species, holotype.

Fig. 14. Same of *Clivina vigil* new species, holotype.

Fig. 15. Same of *Clivina rufula* new species, holotype.

Fig. 16. Same of *Clivina fessa* new species, holotype.

Fig. 17. Same of *Clivina crugata* new species, holotype.

Fig. 18. Outline of last ventral segment with apical setae of *Clivina zebi* Kult.

Fig. 19. Same of *Clivina biroi* Kult.

Fig. 20. Outline of right middle tibia of *Clivina zebi* Kult, Dobodura.

Fig. 21. Same of *Clivina toxopei* new species, holotype.

Fig. 22. Same of *Clivina brevicornis* new species, holotype.

Fig. 23. Same of *Clivina biroi* Kult, Dobodura.

Fig. 24. Same of *Clivina puncticeps* new species, holotype.

Fig. 25. Same of *Clivina kulti* new species, paratype.

Fig. 26. Same of *Clivina vigil* new species, holotype.

Fig. 27. Same of *Clivina deleta* new species, holotype.

Fig. 28. Same of *Clivina rufula* new species, holotype.

Fig. 29. Same of *Clivina tripuncta* new species, holotype.

Fig. 30. Same of *Clivina crugatella* new species, holotype.

Fig. 31. Same of *Clivina crugata* new species, holotype.

Fig. 32. Same of *Clivina subfusa* new species, holotype.

Fig. 33. Same of *Clivina fessa* new species, holotype.

Fig. 34. Same of *Clivina sansapor* new species, holotype.

[1] Figures are drawn to different scales; see descriptions for sizes of insects. Outlines of whole insects are to show form and proportions; antennae and legs are added for habitus, and are to scale, but are semi-diagrammatic and not always exact in detail. The drawings of male copulatory organs are accurate in about apical half, but details are not filled in toward base.

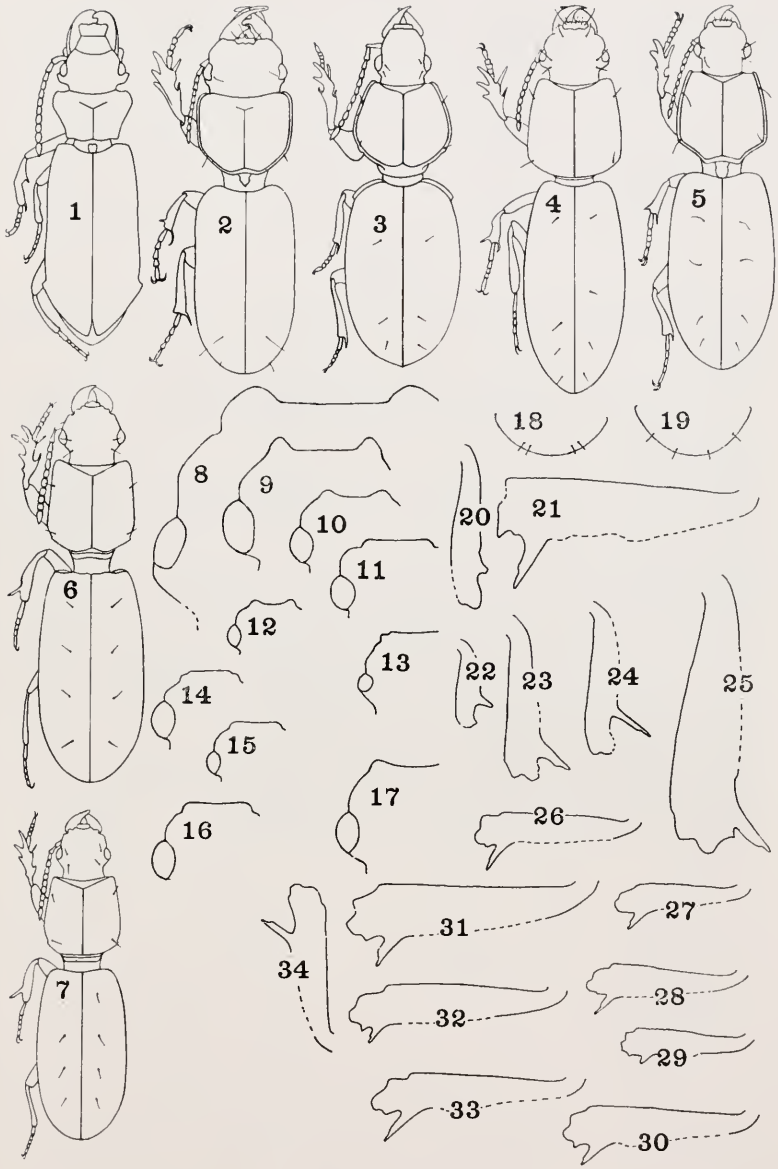

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PLATE 2

Fig. 35. Outline of right middle tibia of *Clivina inopaca* new species, holotype.

Fig. 36. Same of *Clivina gressitti* new species, paratype.

Fig. 37. Same of *Clivina brandti* new species, holotype.

Fig. 38. Outline of left front femur from in front of *Clivina fessa* new species, holotype.

Fig. 39. Same of *Clivina inopaca* new species, holotype.

Fig. 40. Outline of left elytron to show position of dorsal puncture and relation of apical striole to associated puncture of *Tachys fasciatus* Motschulsky, Dobodura.

Fig. 41. Same of *Tachys plagiatus* Putzeys, Port Moresby.

Fig. 42. *Tachys serra latiserra* new species and subspecies, paratype.

Fig. 43. *Tachys tenuiserra* new species, paratype.

Fig. 44. *Tachys sublobatus* new species, paratype, Nadzab.

Fig. 45. *Tachys mastersi pinguis* new subspecies, paratype.

Fig. 46. *Limnastis inops* new species, paratype.

Fig. 47. *Perileptodes jeanneli* new species, paratype.

Fig. 48. *Microschemus quadrimaculatus* (Csiki), ♂, Dobodura.

Fig. 49. *Caelostomus straneoi* new species, holotype.

Fig. 50. *Mecyclothorax toxopei* new species, holotype.

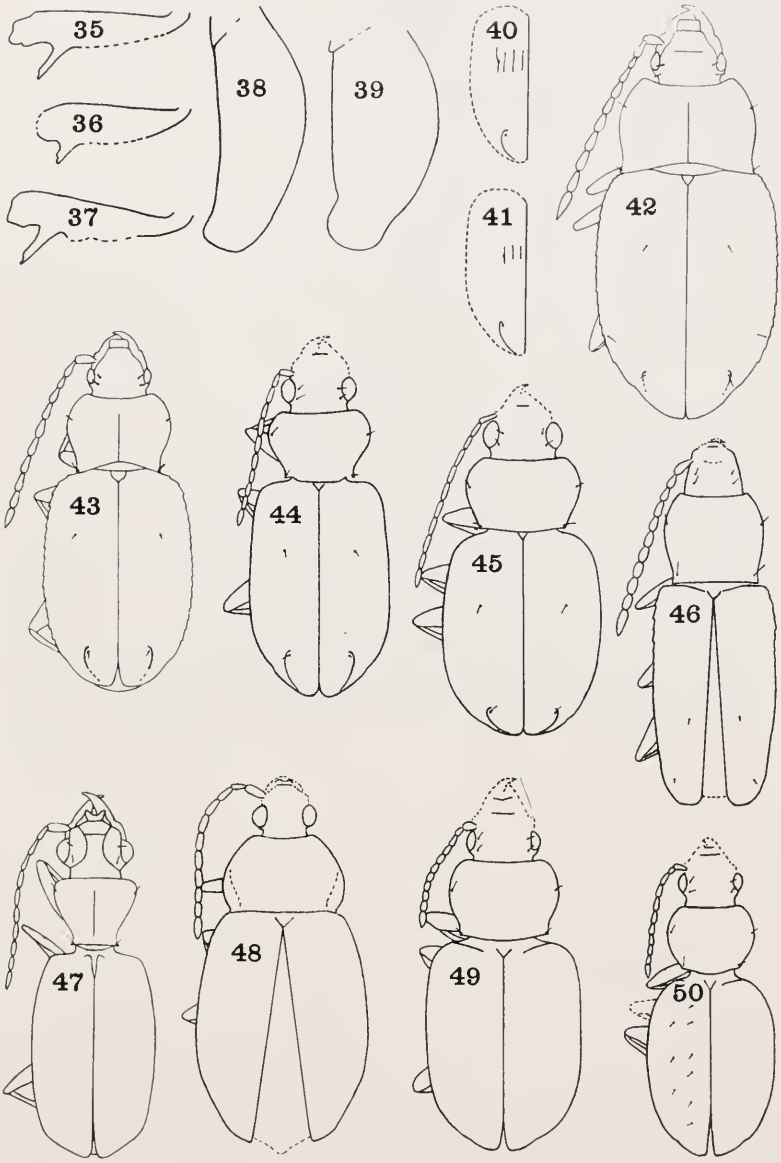
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PLATE 3

Fig. 51. *Cosmodiscus brunneus* new species, holotype.

Fig. 52. *Abacetus straneoi* new species, paratype, Dobodura.

Fig. 53. *Lesticus depressus* new species, holotype.

Fig. 54. *Lesticus ambulator* new species, paratype.

Fig. 55. *Rhytiferonia nigra* new genus and species, ♀, paratype.

Fig. 56. *Paraloma fortis* new genus and species, ♂, holotype, and outline of prothorax of second ♂ from same locality.

Fig. 57. *Platycoelus major* (Straneo), Dobodura.

Fig. 58. *Haploferonia simplex* new genus and species, holotype.

Fig. 59. *Loxandrus subrectus* new species, paratype.

Fig. 60. *Loxandrus medius* new species, paratype, Dobodura.

Fig. 61. *Nebrioferonia straneoi* new species, ♀, paratype, Rattan Camp.

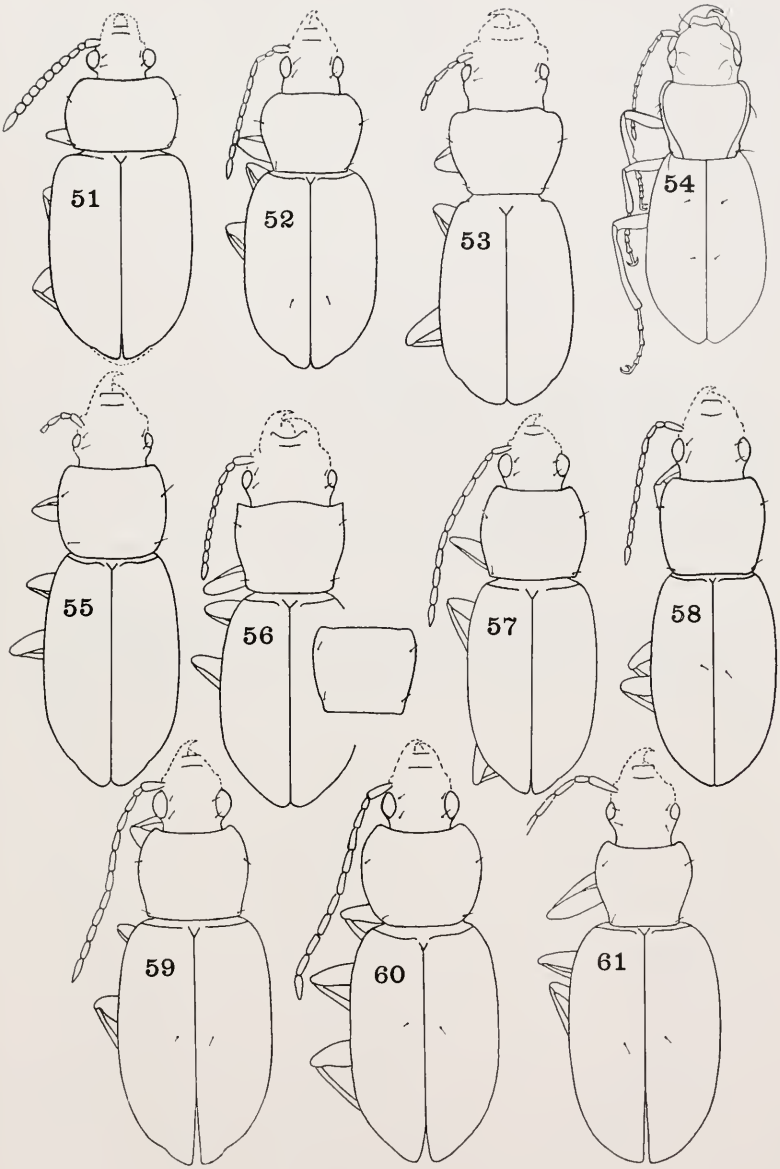
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PLATE 4

Fig. 62. *Tiferonia parva* new genus and species, paratype, Aitape.

Fig. 63. Male copulatory organs from left, with left paramere approximately in position and right paramere detached, of *Rhytiferonia nigra* new genus and species, holotype.

Fig. 64. Same of *Paraloma fortis* new genus and species, holotype.

Fig. 65. Same of *Platycoelus depressus* Blanchard, Madang.

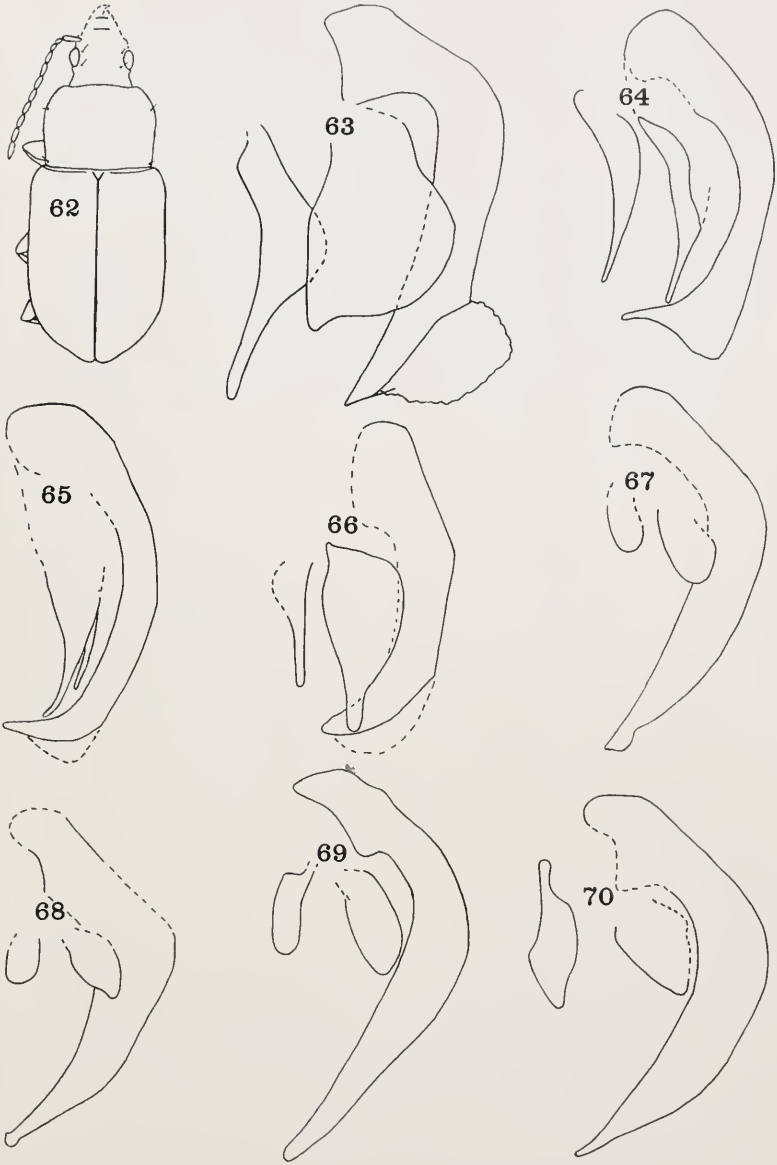
Fig. 66. Same of *Chlaenioideus prolixus* Erickson, Wiluna, Western Australia.

Fig. 67. Same of *Loxandrus medius* new species, paratype, Dobodura.

Fig. 68. Same of *Nebrioferonia strigitarsis* Straneo, Dobodura.

Fig. 69. Same of *Nebrioferonia straneoi* new species, holotype.

Fig. 70. Same of *Tiferonia parva* new genus and species, paratype, Aitape.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